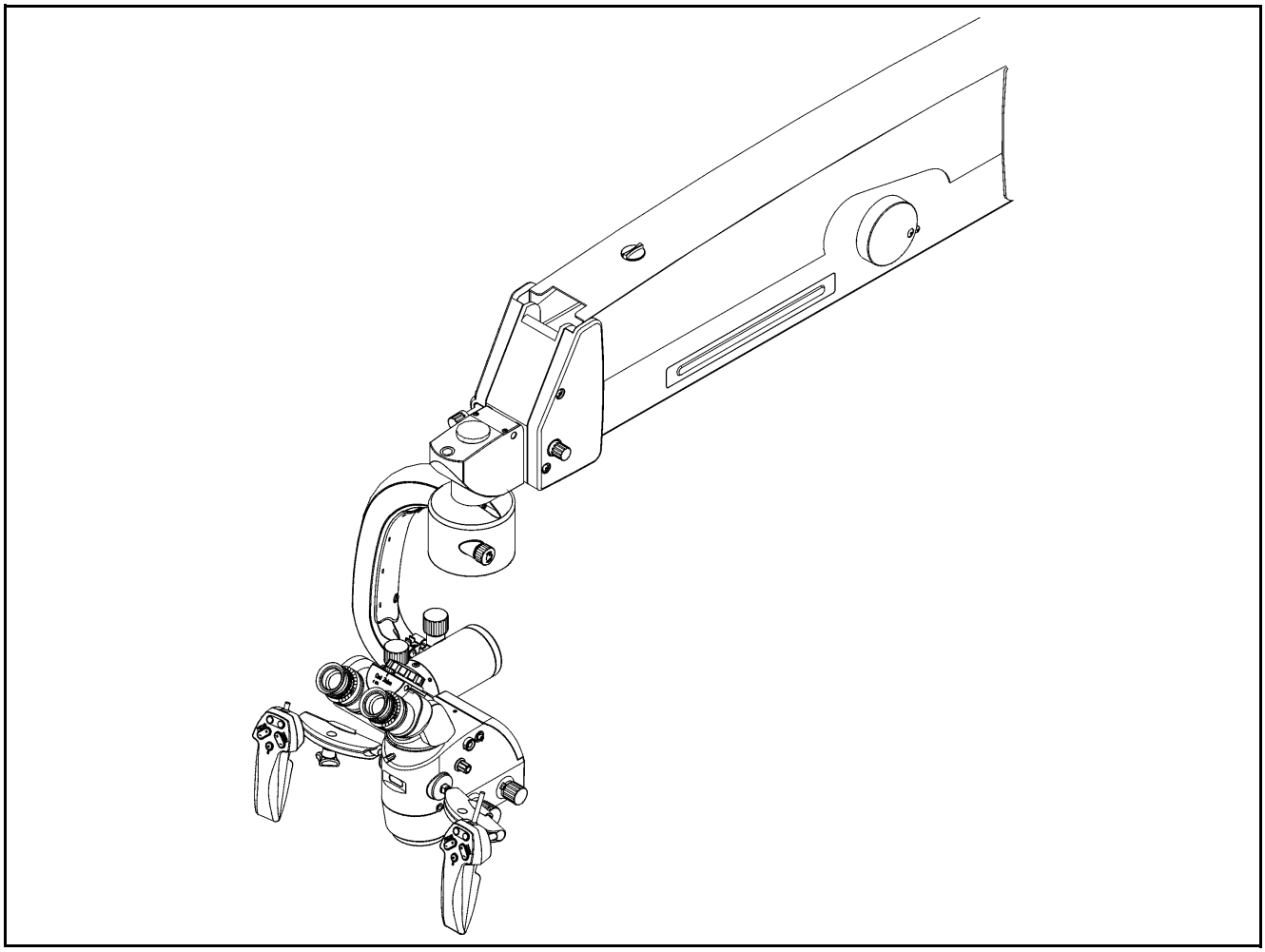
OPMI® VARIO on S8, S81 & S88 Suspension Systems



Instructions for use

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Key to symbols

Different symbols used in this manual draw your attention to safety aspects and useful tips. These symbols are explained in the following.

Warning!
The **warning triangle** indicates potential sources of danger which may constitute a risk of injury for the user or a health hazard.

Caution:
The **square** indicates situations which may lead to malfunction, defects, collision or damage of the instrument.

Note:
The **hand** provides hints on the use of the instrument or other tips for the user.

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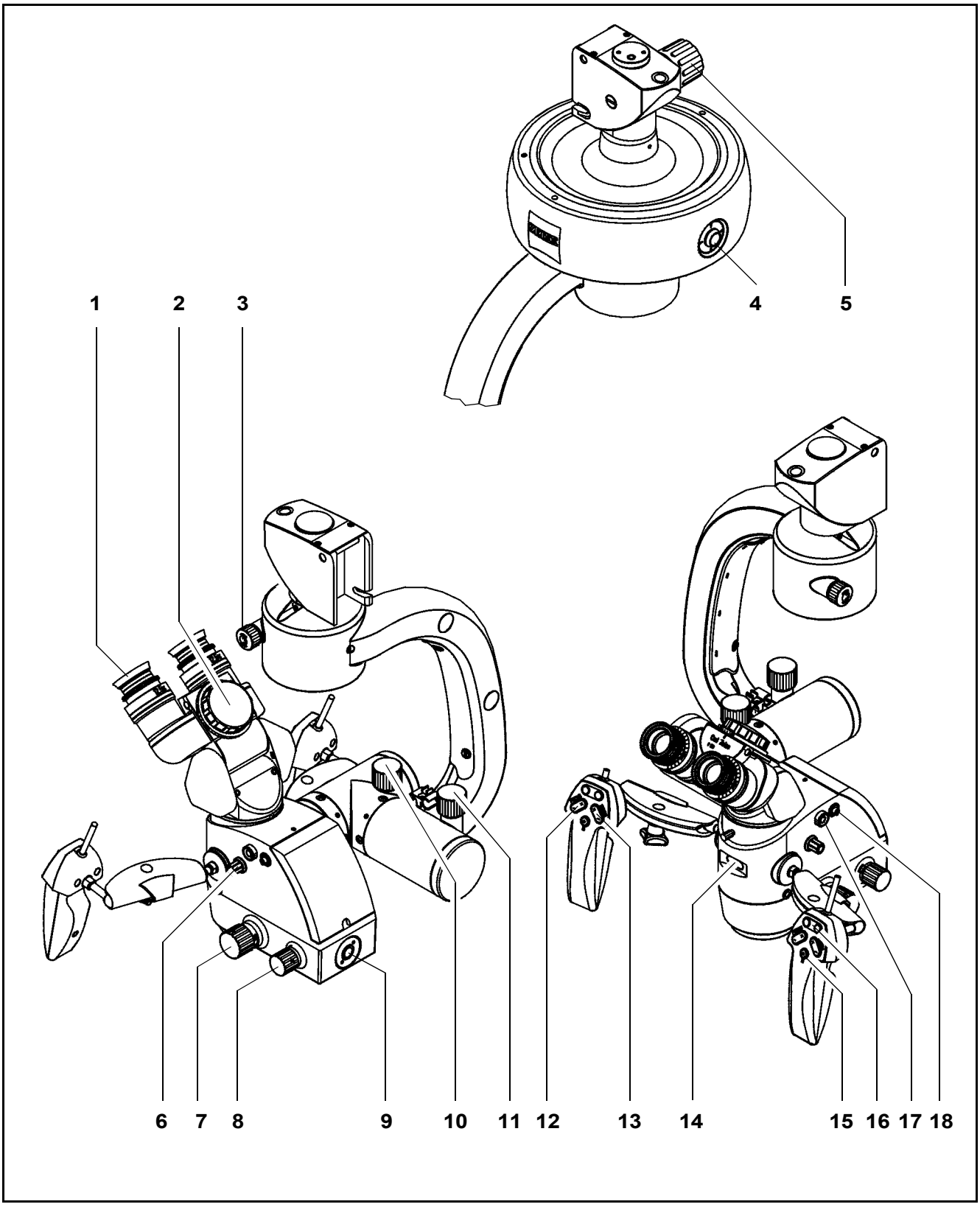
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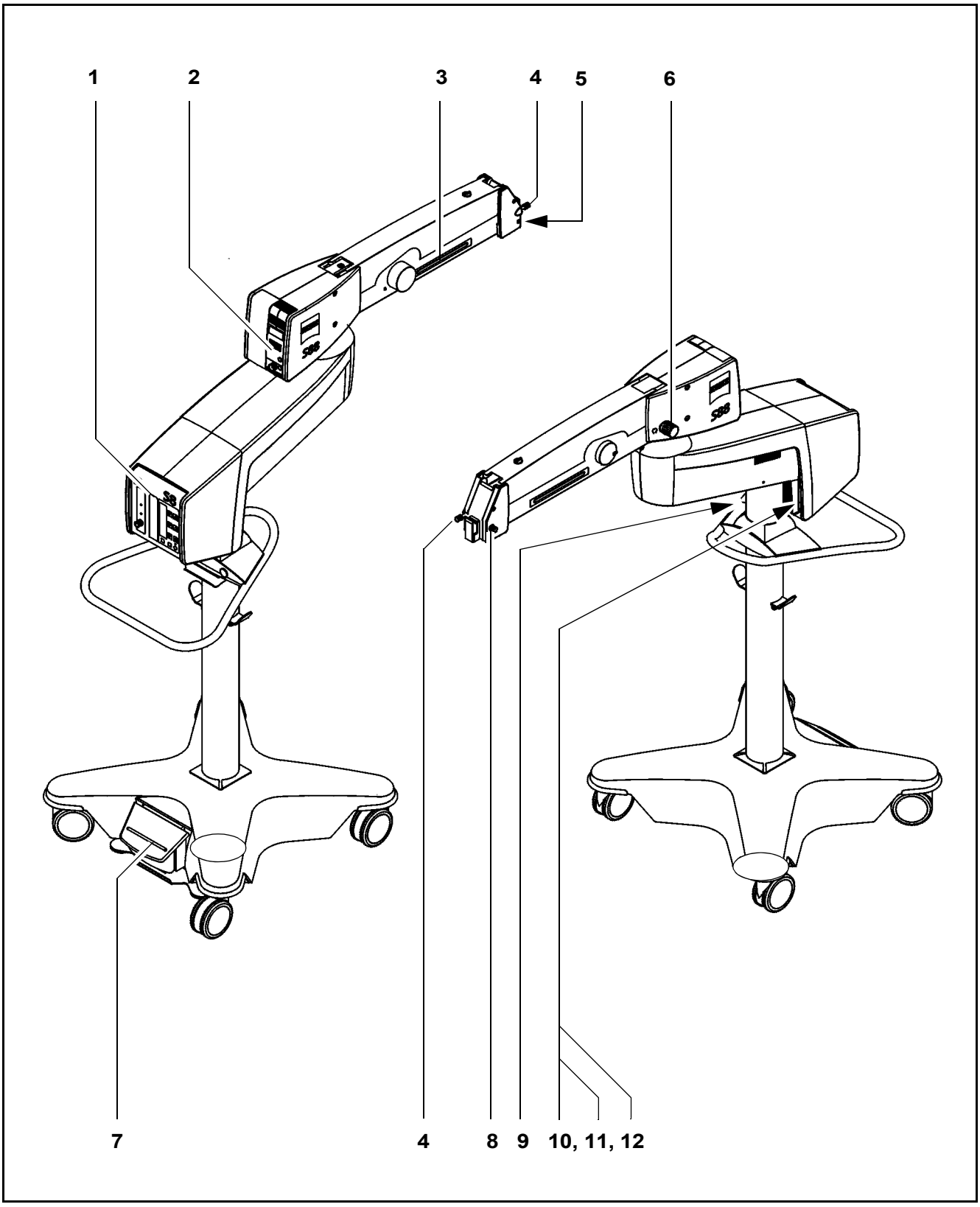
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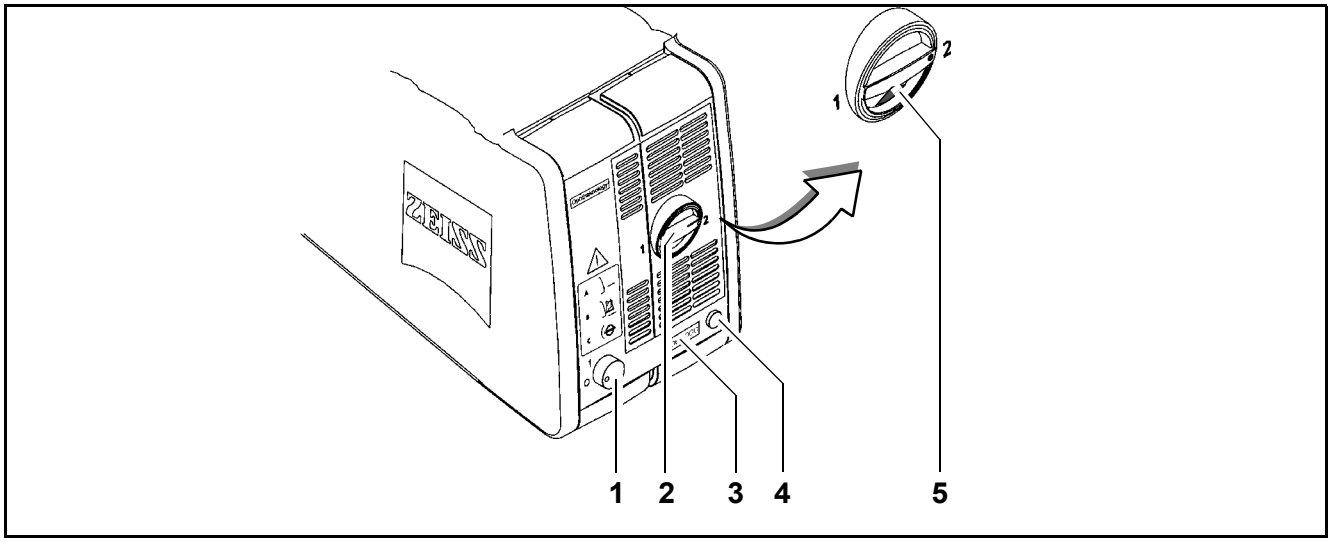

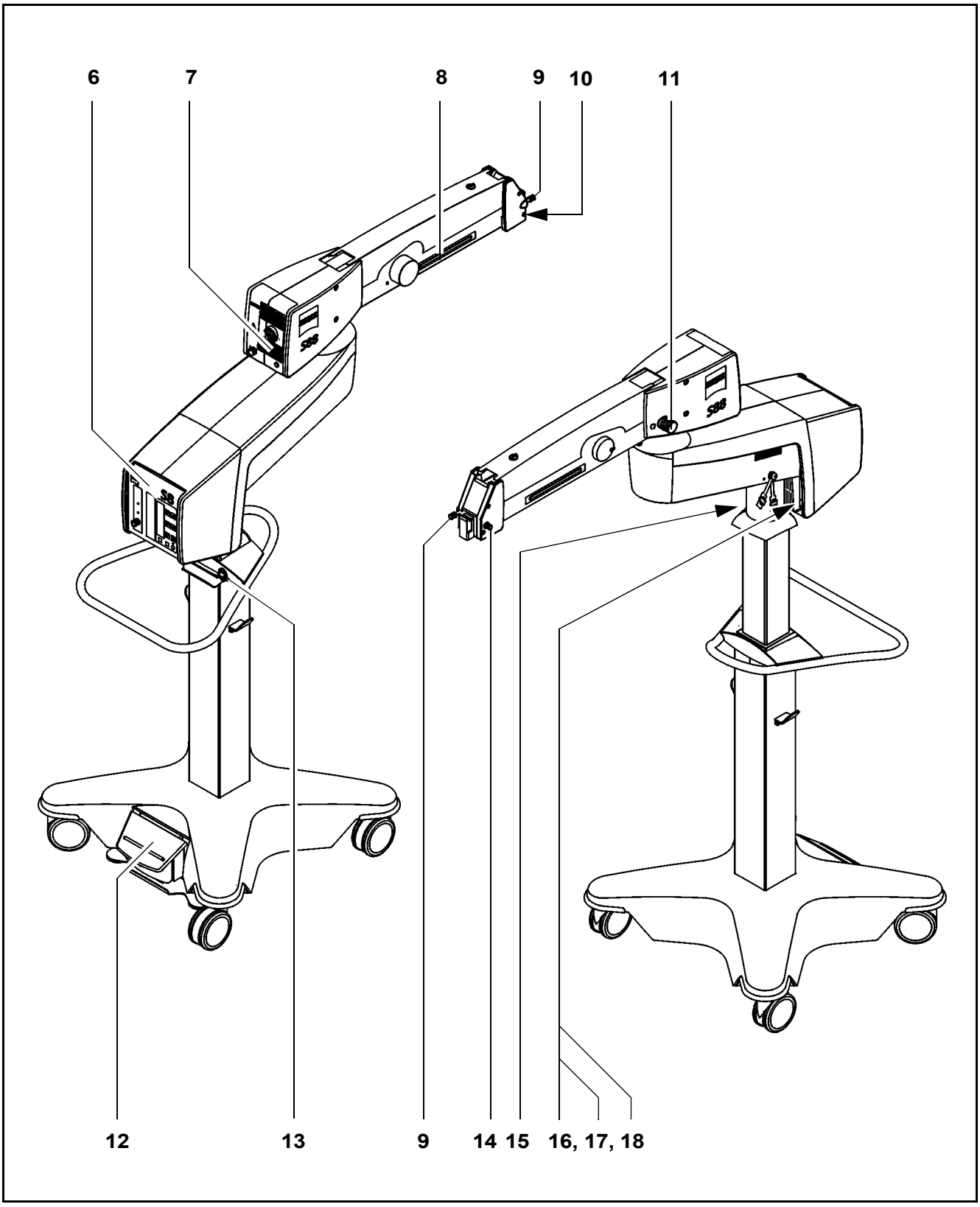
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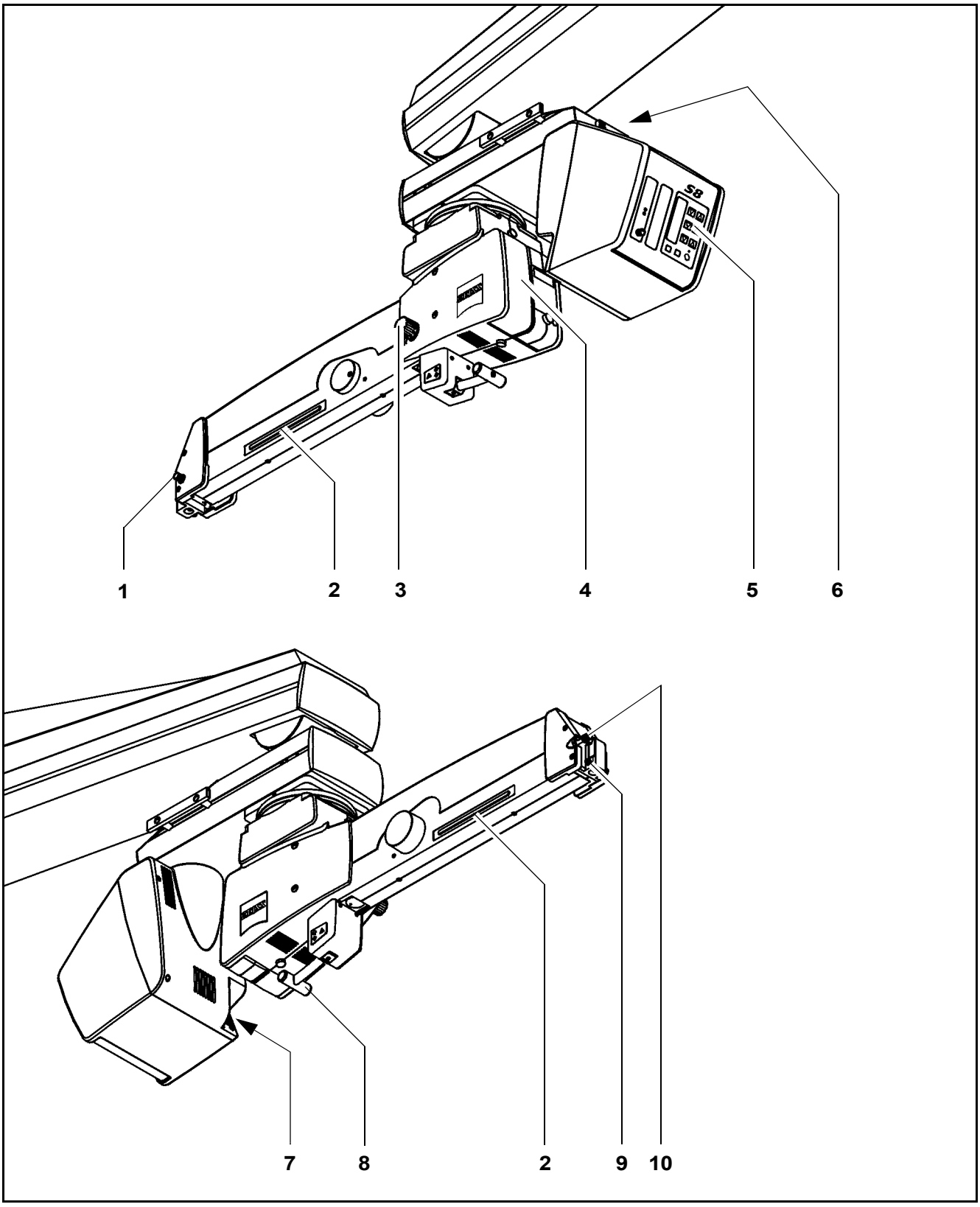
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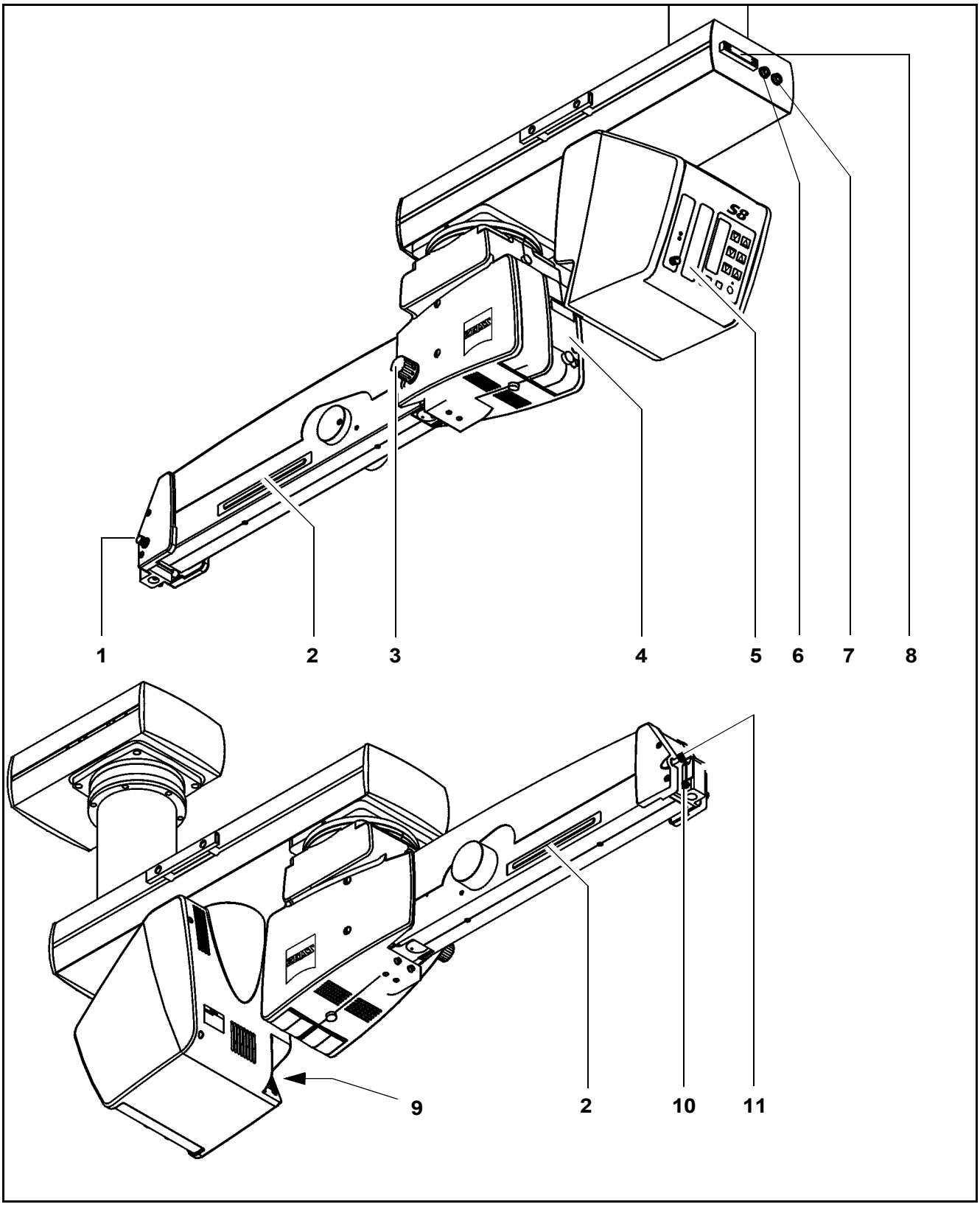
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The device described in this manual has been designed and tested in accordance with Carl Zeiss safety standards as well as German and international standards. This guarantees a high degree of instrument safety.

The system described in this user manual has been designed in compliance with the requirements of:

– EN – IEC – UL – CSA

In accordance with Directive 93/42/EEC for medical devices, the complete quality management system of the company Carl Zeiss Surgical GmbH, 73446 Oberkochen, Germany, has been certified by DQS Deutsche Gesellschaft zur Zertifizierung von Managementsystemen GmbH, a notified body, under registration number 250758 MP23.

– As per Directive 93/42/EEC, the unit is a Class I instrument.

– For USA: FDA classification Class I.

We would like to provide you with information about safety aspects which must be observed when handling this device. This chapter contains a summary of the most important information concerning matters relevant to instrument safety.

Important safety information has been incorporated in this manual and is marked with a warning triangle accordingly. Please give this information your special attention.

The correct use of the system is absolutely vital for safe operation. Please make yourself totally familiar with the contents of this manual prior to start-up of the instrument. Please also observe the user manuals of any additional equipment. Further information is available from our service department or from authorized representatives.

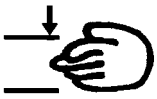
- Please observe all applicable accident prevention regulations.
- The instrument must be connected to a special emergency backup line supply in accordance with the regulations or directives which apply in your country.

Notes on installation and use

Safe working order

- Do not operate the equipment contained in the delivery package in
  - explosion-risk areas,
  - the presence of inflammable anesthetics or volatile solvents such as alcohol, benzine or similar chemicals.
- Do not station or use the instrument in damp rooms. Do not expose the instrument to water splashes, dripping water or sprayed water.
- Switch off the unit at the power switch if you notice any smoke, sparks or unusual noise. Do not use the unit until it has been repaired by our service team.
- Do not place any fluid-filled containers on top of the instrument. Make sure that no fluids can seep into the instrument.
- Do not force cable connections. If the male and female parts do not readily connect, make sure that they are appropriate for one another. If any of the connectors are damaged, have our service representative repair them.
- Potential equalization: The instrument can be incorporated into potential equalization measures. For this purpose, contact our service department.
- Do not use a mobile phone in the vicinity of the equipment because the radio interference can cause the equipment to malfunction. The effects of radio interference on medical equipment depend on a number of various factors and are therefore entirely unforeseeable.
- Modifications and repairs on these instruments or instruments used with them may only be performed by our service representative or by other authorized persons.
- The manufacturer will not accept any liability for damage caused by unauthorized persons tampering with the instrument; this will also forfeit any rights to claim under warranty.
- Over longer distances (e.g. removal, return for repair, etc), the instrument may only be transported in the original packaging or in special return packaging. Please contact your dealer or the Carl Zeiss service team.
- Use this instrument only for the applications described.

- Only use the instrument with the accessories supplied. Should you wish to use other accessory equipment, make sure that Carl Zeiss or the equipment manufacturer has certified that its use will not impair the safety of instrument.
- Only personnel who have undergone training and instruction are allowed to use this instrument. It is the responsibility of the customer or institution operating the equipment to train and instruct all staff using the equipment.
- Keep the user's manuals where they are easily accessible at all times for the persons operating the instrument.
- Never look at the sun through the binocular tube, the objective lens or an eyepiece.
- Do not pull at the light guide cable, at the power cord or at other cable connections.
- This instrument is a high-grade technological product. To ensure optimum performance and safe working order of the instrument, its safety must be checked once every 12 months. We recommend having this check performed by our service representative as part of regular maintenance work.
  If a failure occurs which you cannot correct using the trouble-shooting table, attach a sign to the instrument stating it is out of order and contact our service representative.



- Observe the labels showing the symbol "Risk of crushing“!

Notes on EMC (electromagnetic compatibility)

The system meets the EMC requirements of IEC 60601-1-2. During use of the system, the precautionary measures concerning EMC listed below must be observed.

Only use accessories that have been approved by Carl Zeiss for this system.

Do not use any portable or mobile high frequency communication devices in the vicinity of the system, as this may lead to an impairment of its function.

The system complies with the limits for a Class A device concerning radio frequency emission. However, the possibility of interference to high frequency receiving devices (e.g. TV sets or radios) being used in the surroundings cannot be ruled out. If interference of this type occurs, please inform your Carl Zeiss Service.

Connection of a laser micromanipulator

The link-up of a laser micromanipulator with the OPMI results in a medical system for which the system manufacturer must meet the necessary requirements (approval, qualification, laser protection, etc.). Please note the user manuals provided by the laser micromanipulator manufacturer and laser manufacturer. Further information is available from our service department or from authorized representatives.

Connection of navigation systems (option)

The Carl Zeiss components "Surgical microscope on suspension system" can be integrated into an external navigation system. An optional navigation interface is available.

- The manufacturer of the external navigation system (system supplier) is responsible for the following:
  - Confirmation that his navigation systems have been tested and certified for operation with the respective Carl Zeiss surgical microscope on a suspension system in accordance with the requirements specified in the Carl Zeiss interface description "Navigation Interface for Carl Zeiss Surgical Microscopes".
  - Meeting all requirements (approval, qualifications, etc.) for the medical system created through coupling via the navigation interface.
  - Provision of all accompanying documents required.
  - Ensuring that the navigation system is only connected by personnel who have undergone appropriate training and instruction.
  - Contacting the local Carl Zeiss representative for any inquiries that may arise.
  - Implementation of a procedure that guarantees the calibration of the surgical microscope which is absolutely vital for the use of the Carl Zeiss components "Surgical microscope on suspension system" in combination with a connected navigation system.
    This allows the calibrated surgical microscope combined with the navigation system to be used like an optical pointer with a variable length (corresponds to the working distance).
  - Conducting complete functional testing, alignment and calibration (landmark test) of the navigation system after every subsequent installation or exchange of navigation system components
  - Incorporation of a regularly changing icon in the data injection display of surgical microscopes equipped with a data injection system, i.e. the "heartbeat" of the navigation system must be constantly visible for the user to permit data transmission errors to be immediately detected.
- To check the accuracy of the overall system, perform the test specified by the navigation system manufacturer, e.g. the landmark test, also using the surgical microscope. This allows you to ensure that the stereotactic data has been correctly generated and transmitted to the navigation system without errors.

- Do not use any rotatable tube dovetail mounts when operating the surgical microscope with a connected navigation system. If mounts of this type have been attached to the microscope, they must be carefully locked in their central positions (tighten the knurled screw for rotation).

Requirements on the antenna design (non-Zeiss antennas)

- The antenna manufacturer must confirm that his antenna has been tested and certified for operation with the respective Carl Zeiss surgical microscope on a suspension system in accordance with the requirements specified in the Carl Zeiss interface description "Navigation Interface for Carl Zeiss Surgical Microscopes".
- The following requirements, in particular, apply to the antenna:
  - The surgical microscope with accessories and the antenna must not exceed the admissible total weight (see label or the chapter "Technical data").
  - The antenna must not project over the bottom edge of the microscope body in the direction of the surgical field.
  - The antenna must neither obstruct the movement and adjustability of the accessories which can be used on the surgical microscope (usually a stereo coobservation tube, a camera adapter, a face-to-face tube for spinal surgery, a laser micromanipulator) nor collide with these accessories.
  - The antenna configuration must be implemented in such a way that the localizer camera can always "see" the diodes or trackballs when the surgical microscope and its accessories are in their usual positions.
  - When the system's internal antenna wiring is used, the EN60601-1-2 standard (electromagnetic compatibility) must be complied with.
  - The output power of the LEDs or infrared LEDs (IRED) must always comply with the IEC 60825 laser safety standard, even in the event of cable defects.
  - The failure of one or several LEDs of the antenna may impair navigation or lead to navigation failure. Take the necessary precautions.

Requirements for operation

- For ceiling mounts only: Our service staff or a qualified person appointed by us will install the system on ceiling anchors which have been properly mounted by the construction engineers responsible. These ceiling anchors must comply with the specifications contained in our planning manual.
- Our service representative or an expert authorized by us will install the system. Please ensure that the following requirements are met for further operation:
  - All connecting components (details in the user's manual) which are relevant to system safety have been properly connected, and the screw connections have been firmly tightened.
  - All cables and plugs are in perfect condition.
  - The voltage set on the instrument corresponds to the rated line voltage on the site of installation.
  - The power cord has been plugged into a power outlet which has a properly connected protective ground contact.
  - The power cord being used is the one designed for use with this system.

Before every use and after re-equipping the instrument

- Make sure that all ”Requirements for operation” are fulfilled.
- Go through the checklist.
- Re-attach or close any covers, panels or caps which have been removed or opened.
- Pay special attention to warning symbols on the instrument (triangular warning signs with exclamation marks), labels and any parts such as screws or surfaces painted red.
- Do not cover any ventilation openings.

For every use of the instrument

<u>General</u>

- Never operate the system unattended.
- Avoid looking directly into the light source, e.g. into the microscope objective lens or a light guide.
- When the illumination is on, the light guide must be connected at both ends. Otherwise there is a risk of fire or burn injuries.

- Make sure that the instrument has been switched off before you change the xenon lamp module. When switched on, the ignition system generates high voltage.
- The xenon illumination system is a high-intensity light source which - if used improperly - can cause thermal injury to skin or tissue. Keep the exposed tissue moist and provide sufficient irrigation. Carefully monitor the effects of the illumination on the tissue, in particular in the following cases:
  - during prolonged procedures on skin and tissue using objective lenses with a short focal length (short working distance),
  - during procedures on tissue with a low blood supply,
  - with high brightness settings of the xenon lamp.
- Since the xenon lamp provides high light intensity and generates light with a spectrum similar to daylight, it must not be used for ophthalmic applications.
- Any kind of radiation has a detrimental effect on biological tissue.This also applies to the light illuminating the surgical field. Please therefore reduce the brightness and duration of illumination on the surgical field to the absolute minimum required.

S88 floor stand

- Using the locking pedal on the base, secure the stand in position. Make sure that the stand is stable and cannot roll away.

After every use of the instrument

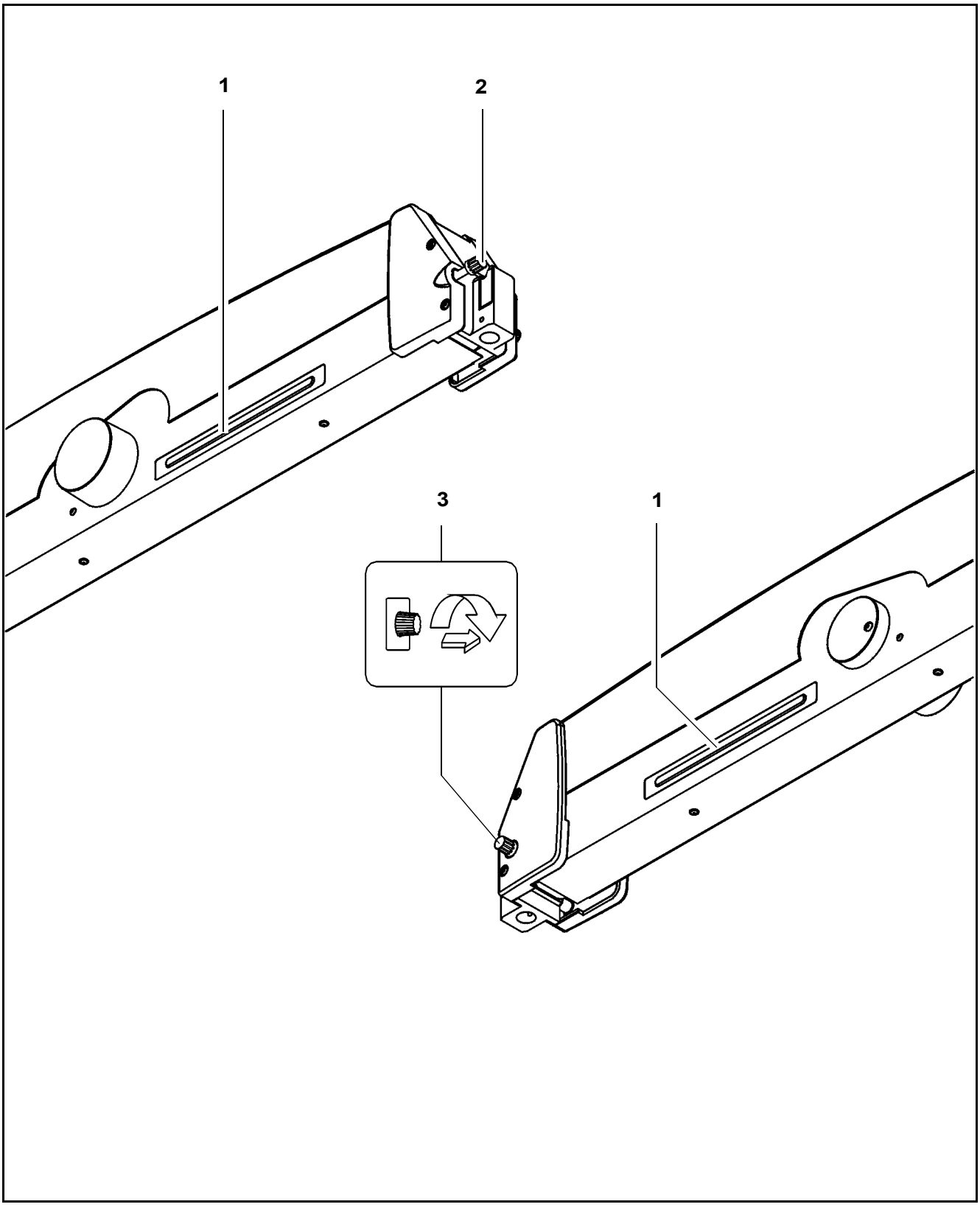
- Always use the main power switch of the instrument to turn it off.
- The main power switch must always be turned off when the instrument is not in use.

Safety devices of the suspension systems

1 Release bar
Allows non-sterile persons to release the magnetic brakes of the suspension system.

2 Adjustment screw for limiting the downward travel
Use this screw to set the minimum vertical distance (working distance) from the surgical field. Check this setting before each surgical procedure.

3 Locking knob
for locking the suspension arm in its horizontal position.
Before removing or attaching a unit (microscope, tube, etc.), move the suspension arm into a horizontal position. Pull out the locking knob and turn it clockwise or counterclockwise through 180°, while slightly moving the suspension arm up and down until the lock engages. When locked, the suspension arm can no longer suddenly spring upward when insufficient weight is attached. After attaching a unit, perform the balancing procedure.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Stand lifting column

1 Key
to set the optimum viewing height of the surgical microscope or for downward movement into the transport position.
As long as you keep switch (1) pressed down, the lifting column (2) in the stand base moves upwards or downwards, depending on the position of the switch. When you release the switch, the lifting column stops immediately.

– Before raising or lowering the suspension system, make sure that there is sufficient clearance from other objects so that any collision is avoided.

Warning!

– Do not activate the lifting column during surgery!

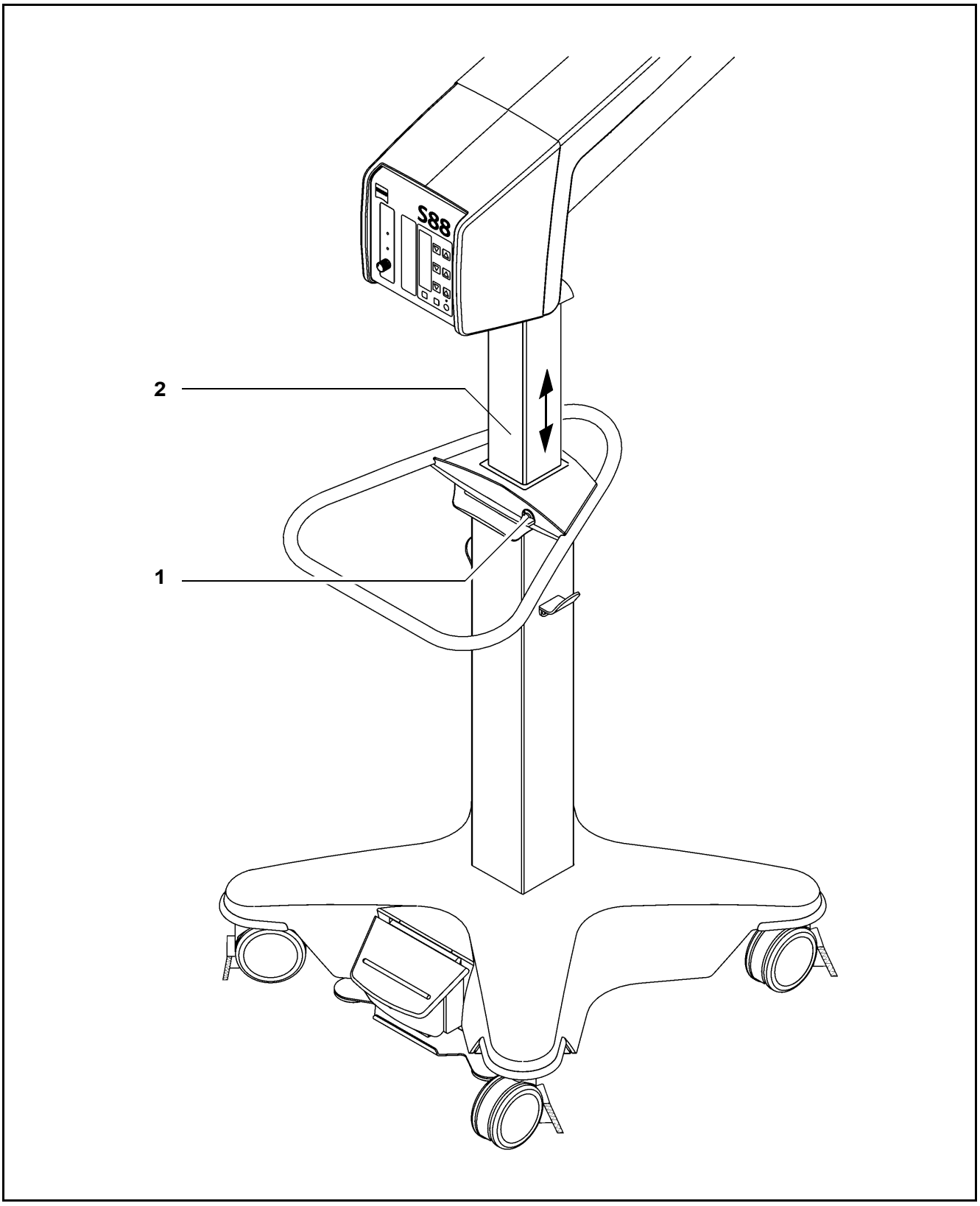
– Do not use the lifting column for focusing.

– When using the fundus imaging system which is installed between the surgical microscope and the patient, make sure that the patient is neither put at risk nor injured

  – by the motorized movement of the lifting column,

  – by the motorized focusing system,

  – by the movement of the suspension arm.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Xenon illumination system

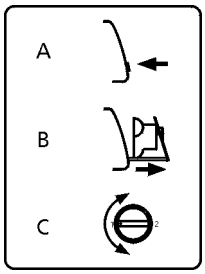
Warning!
The xenon lamp has a limited service life of 500 h.

If used beyond its maximum service life, the xenon lamp may explode.

- Replace the xenon lamp in good time.
- Reset the service hour counter to "0" after replacing the lamp.

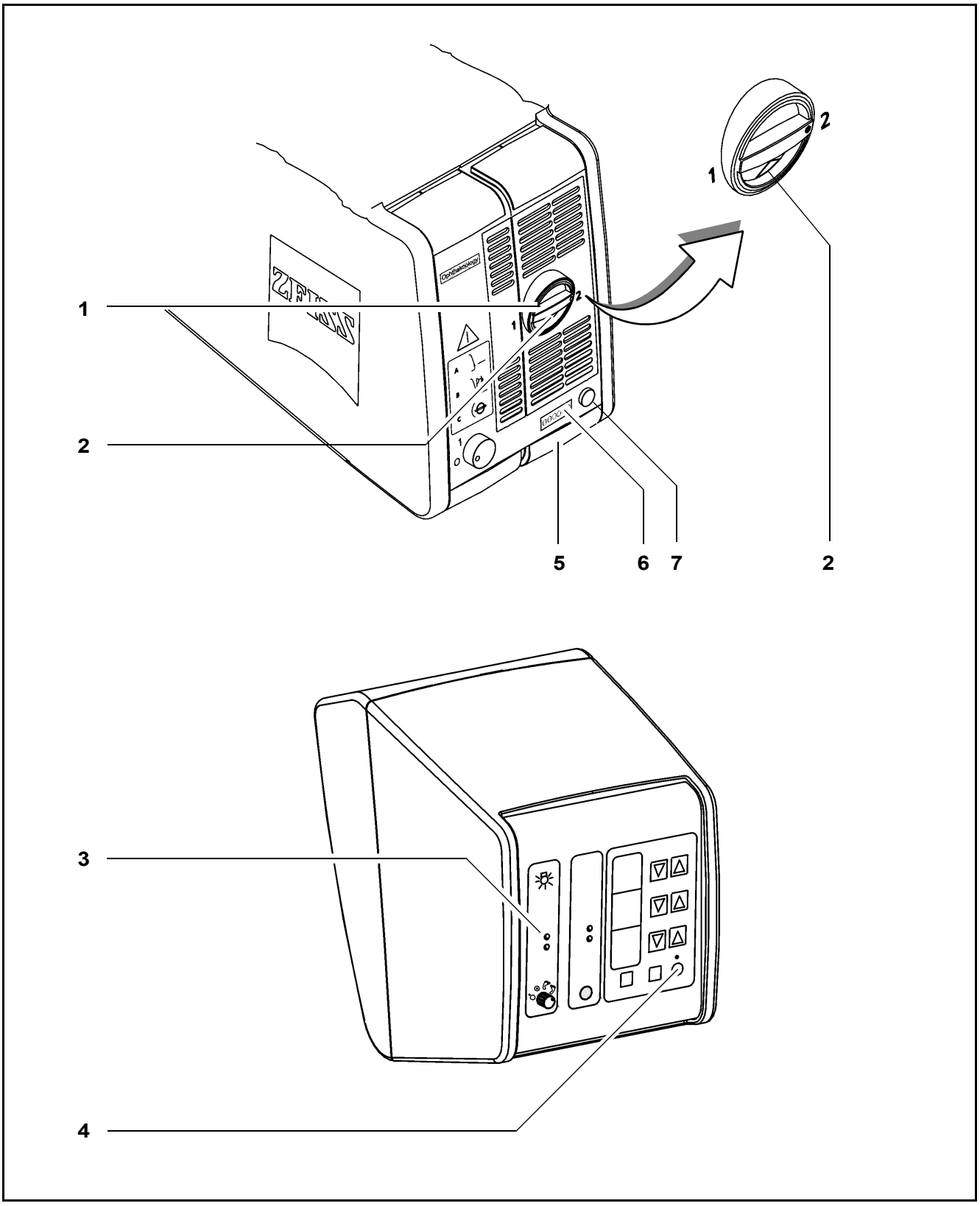
Warning!
Lamp rupture (audible as a loud bang) may lead to jamming of the lamp module and/or failure of the electronics modules.

- Before opening the lamp housing, make sure that the system is moved to a position where neither the patient nor the user is put at risk by falling items.
- Do not continue using the system if the lamp module is jammed or the illumination is no longer operational due to defective electronics modules. Inform our service department.



1 Switching to the backup lamp
The lamp module contains two xenon lamps. The second bulb is used as a backup bulb which must be swung into the illumination beam path if the first bulb fails.

- If the xenon bulb fails, open the lamp module as follows: Press button (7). The lamp module is slightly ejected.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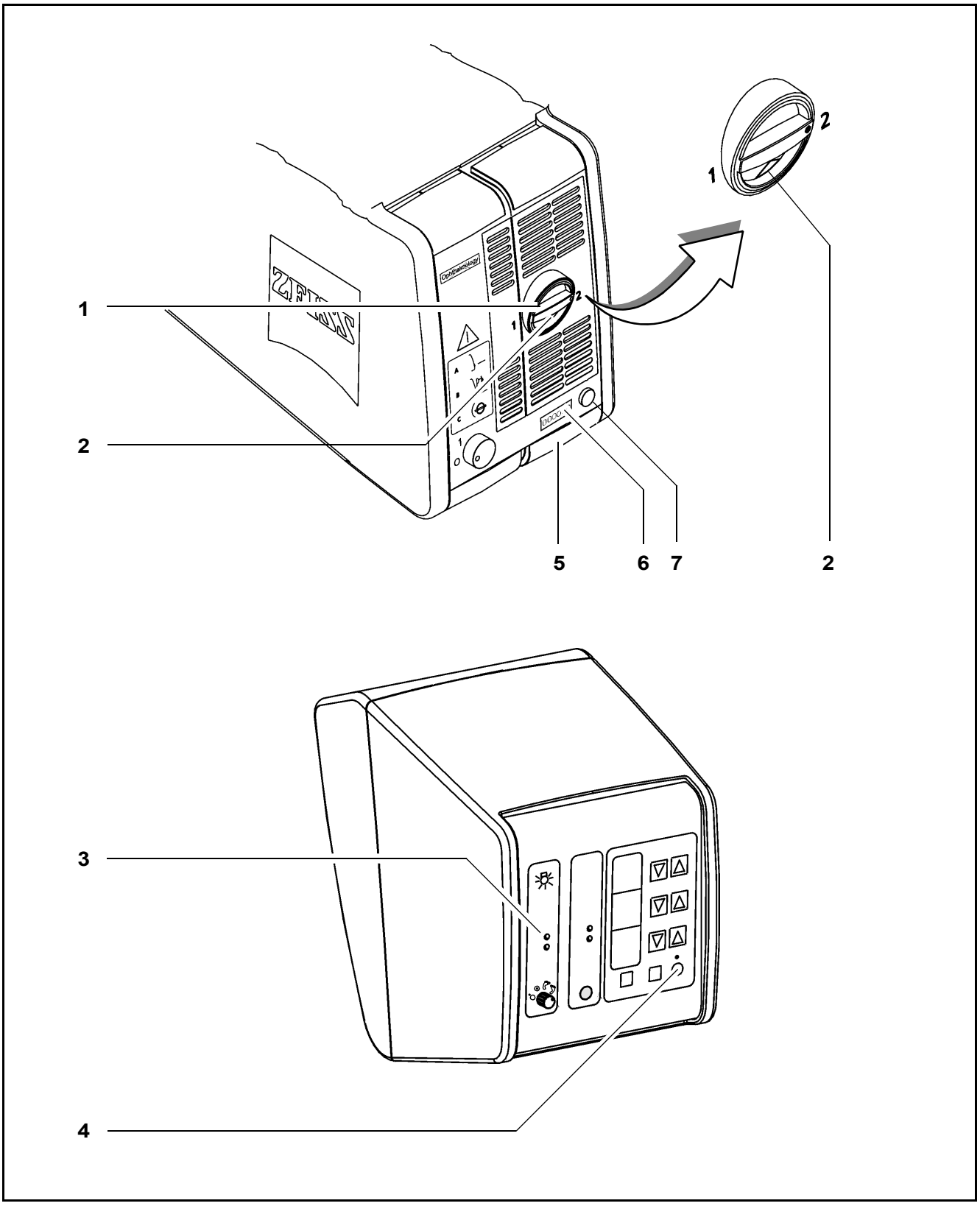
- Pull out the lamp module as far as it will go.
- Turn knob (1) through 180° until it snaps in place. This moves the backup lamp into the illumination beam path.
- Push the lamp module all the way back into the lamp housing.
- Reset service hour counter (6) to "0". Use a pointed object and press it into the recess of reset button (5).

2 Indicator: backup lamp is in use
When the red segment in knob (1) lights up, the backup bulb is in use.

Note:
If the first bulb has failed and the backup bulb is in use, make sure to have a backup lamp module at hand as a precaution.

3 Yellow indicator lamp
Lights when the bulb has failed, or if the lamp module is defective. After activation and ignition of the backup bulb, the yellow indicator lamp turns off again.

4 Manual function
When the manual function has been activated, all electrical control systems are disabled. The bulb brightness is automatically adjusted to a fixed setting.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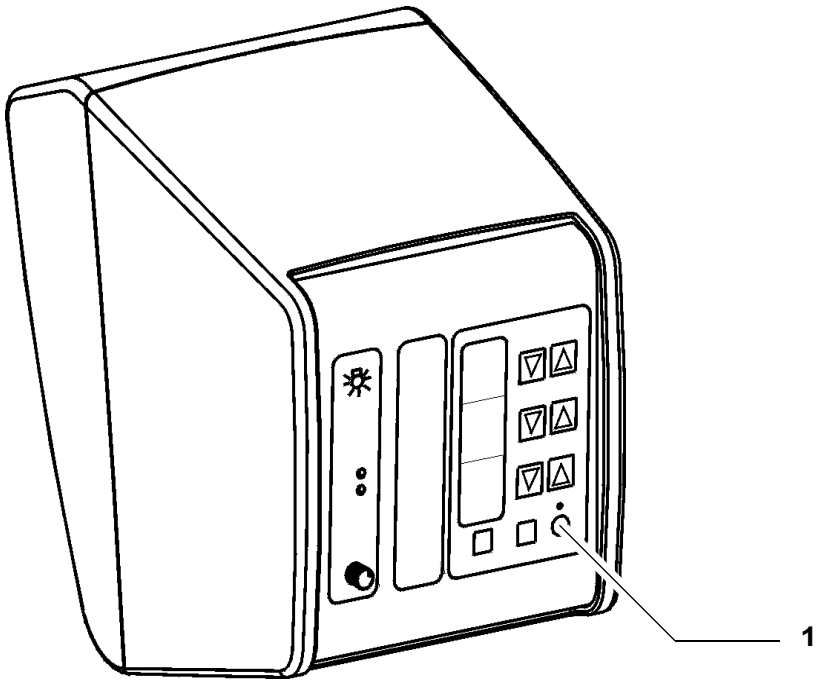
Manual function

1 Manual key
The Manual key permits you to switch to manual operation. The motorized control functions of the surgical microscope are deactivated. The lamp brightness is automatically adjusted to a fixed setting, the value being shown in the first display section.
When the manual mode is activated, the yellow LED is lit and the word "MANUAL" blinks in the third display section.

The surgical microscope can no longer be operated via the foot control panel, the handgrips or the display and key field.
In the manual mode, you can only switch the illumination on and off on the foot control panel and release the magnetic brakes by pressing the appropriate key on the surgical microscope.

The manual mode is retained even if you turn the power switch of the instrument off and on again.

Press the Manual key once again to reactivate electronic control; the display in the display and key field then returns to the basic mode.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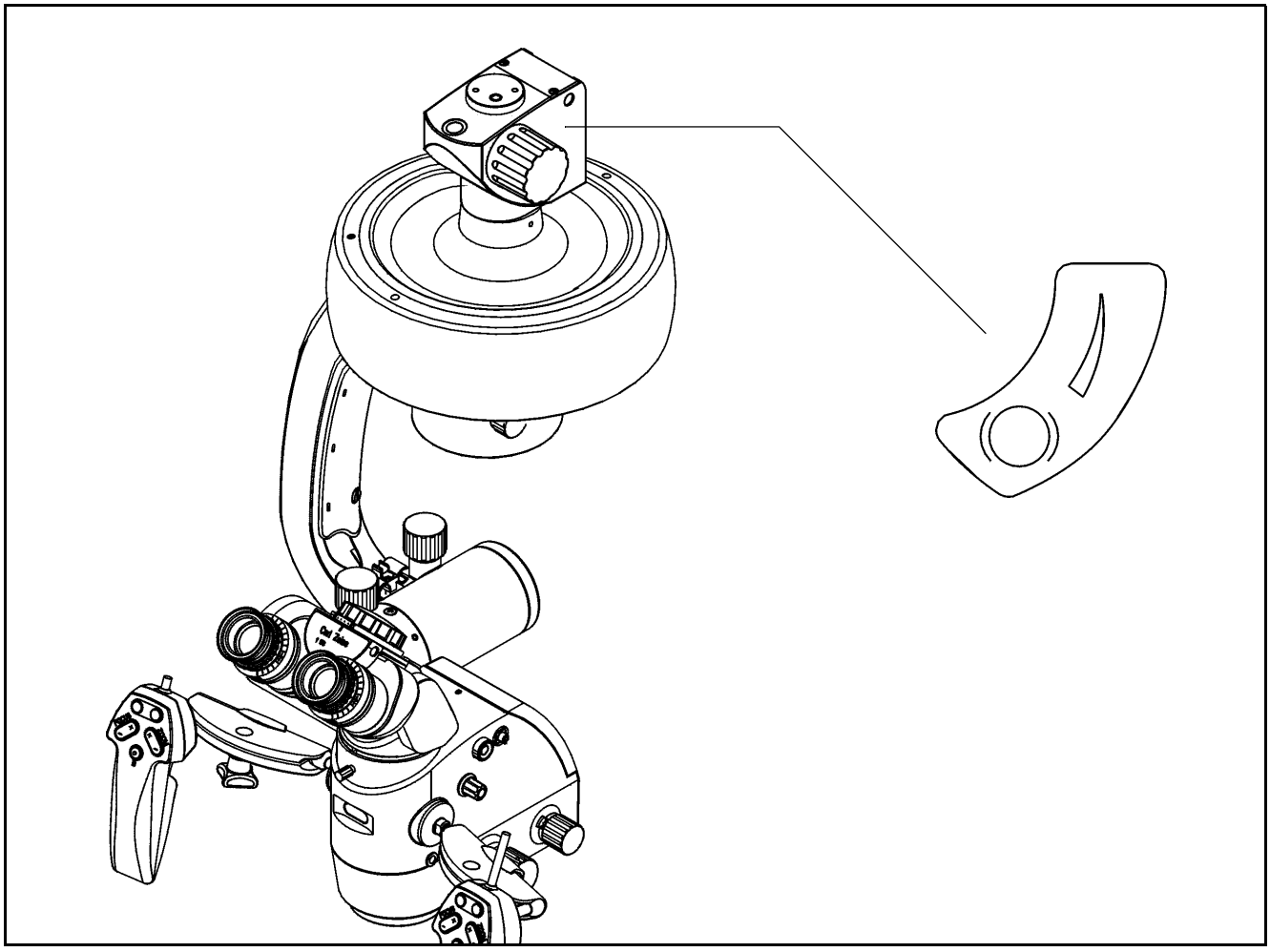
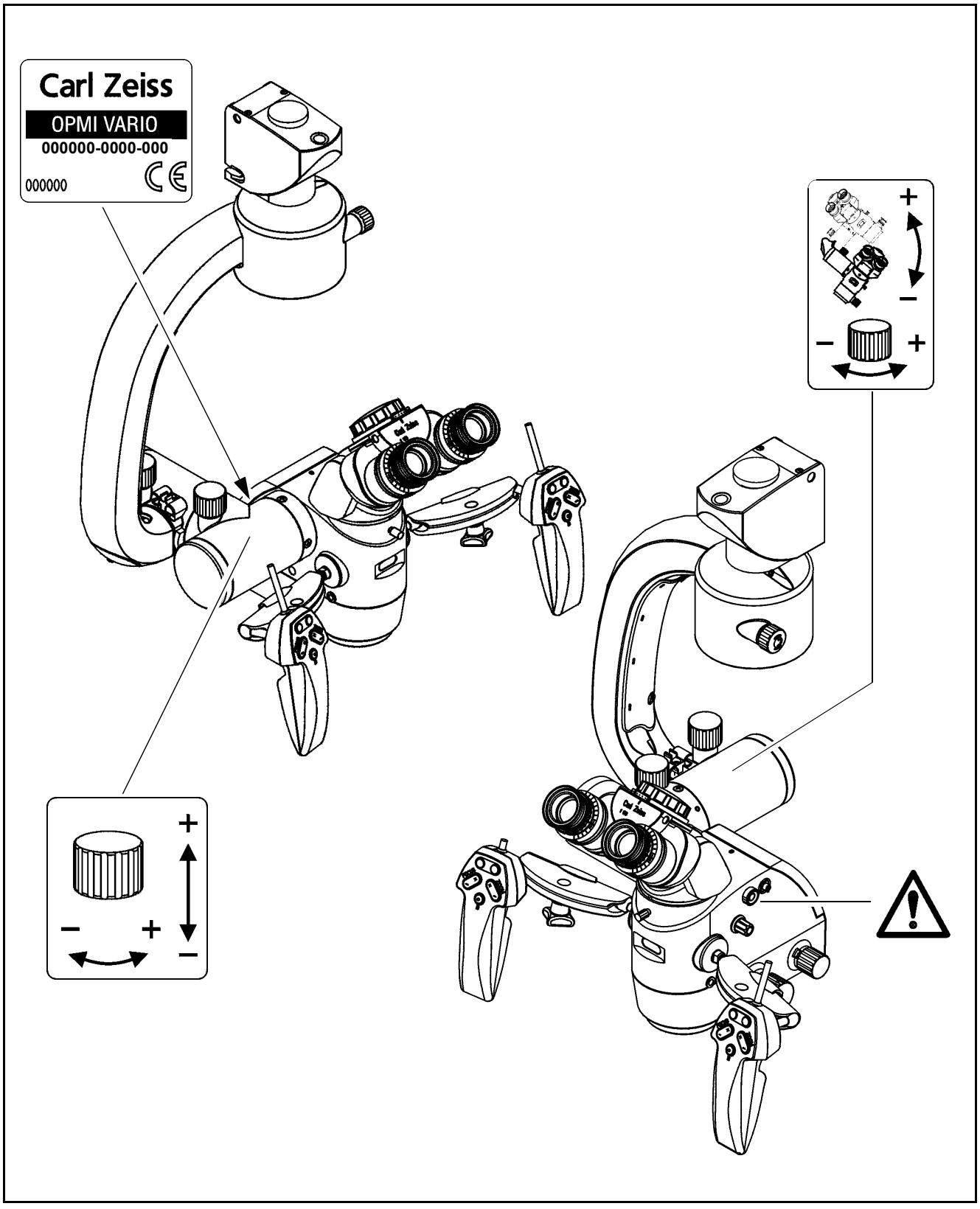
Warning labels and notes

Caution:
Observe all warning labels and notes!
If any label is missing on your instrument or has become illegible, please contact us or one of our authorized representatives. We will supply the missing labels.

OPMI VARIO

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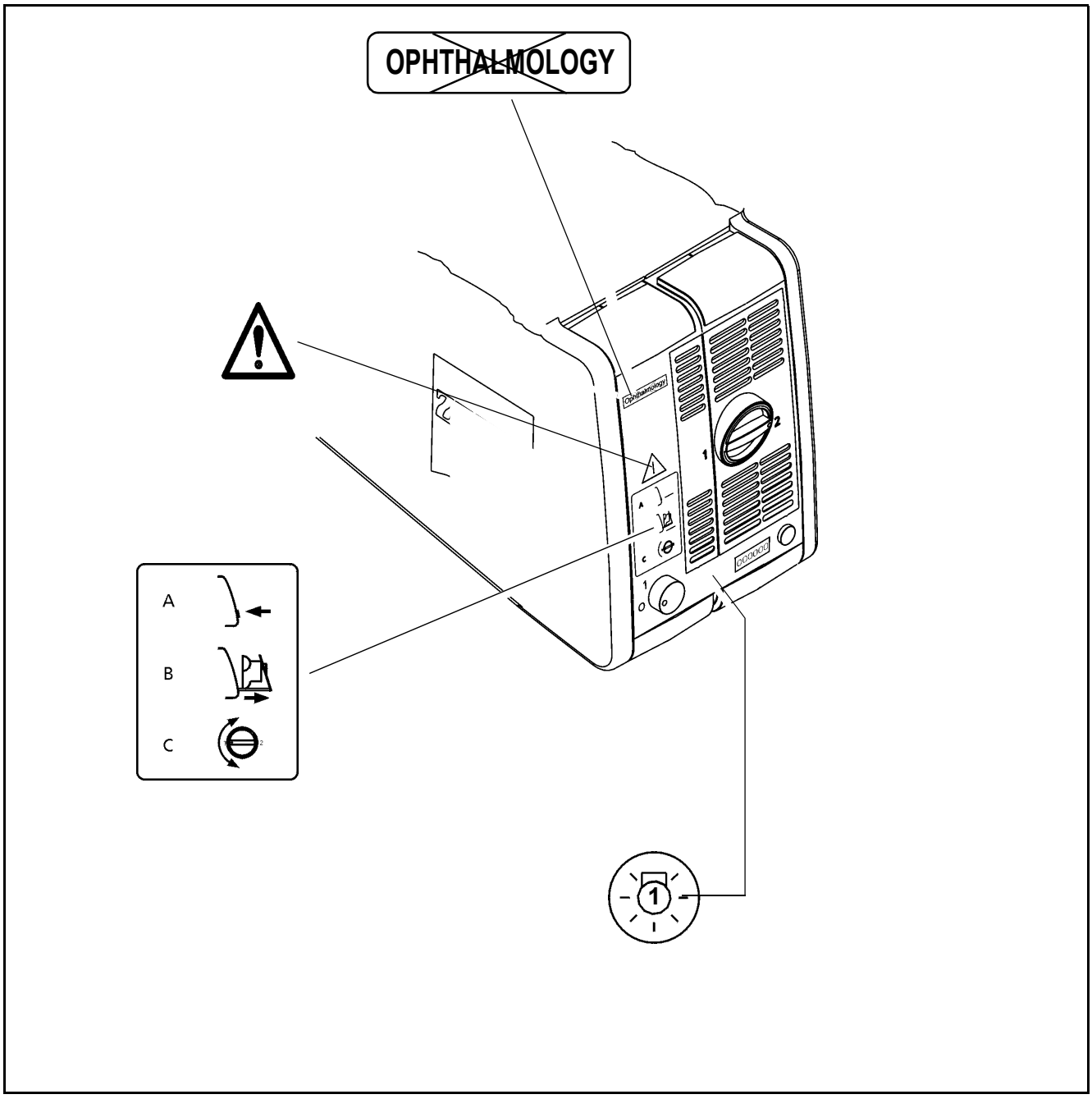
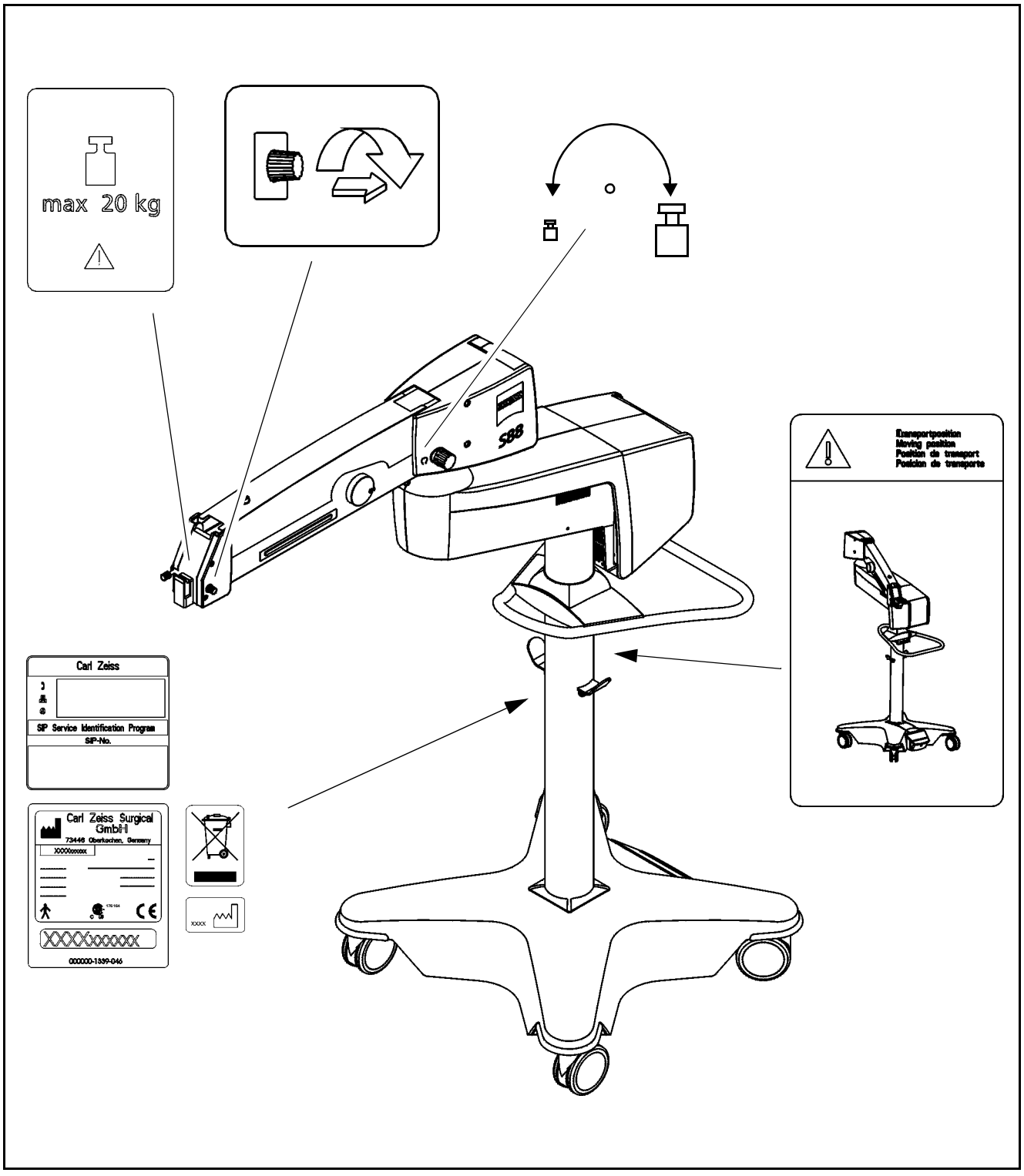
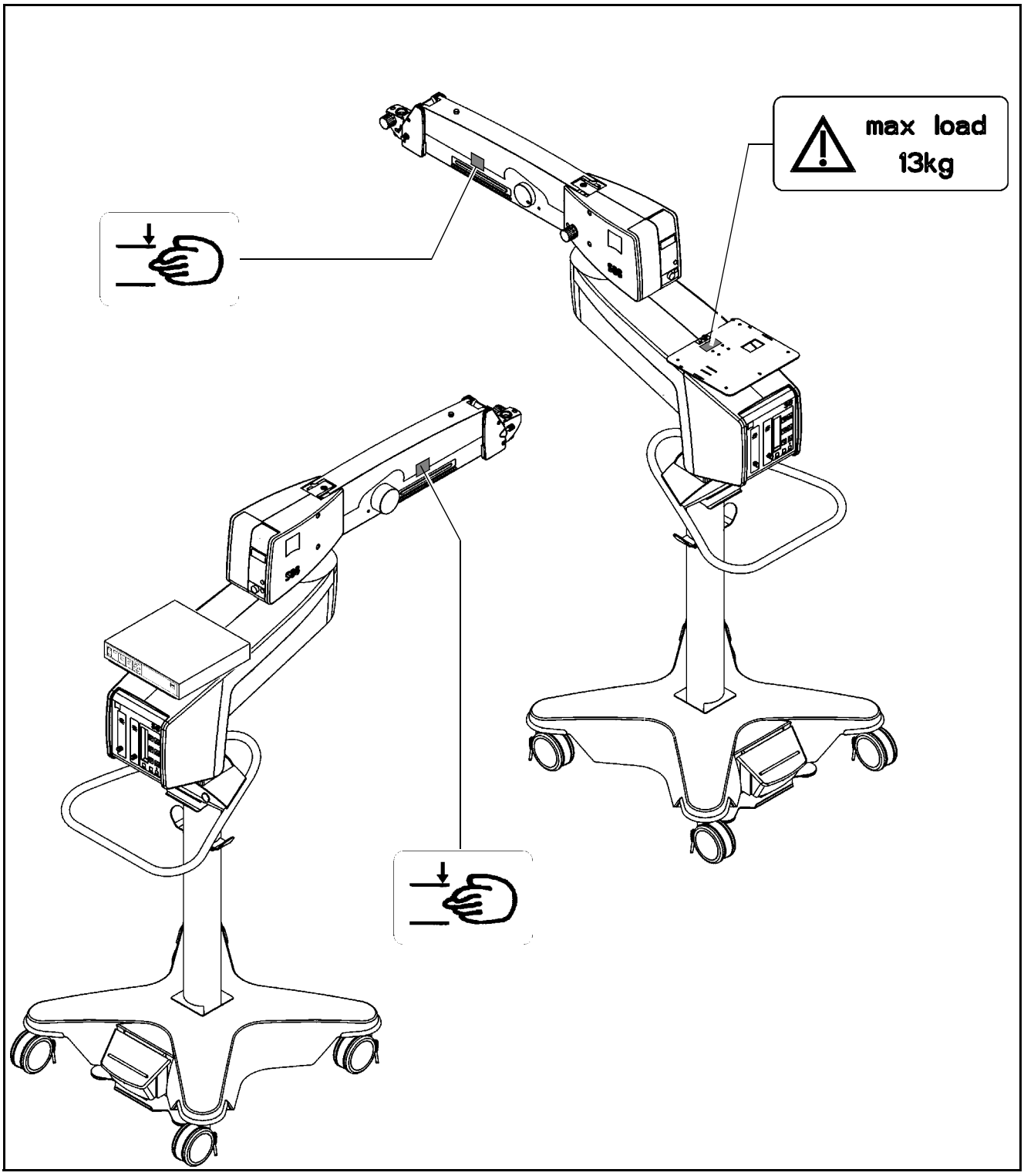
Suspension systems - xenon illumination system



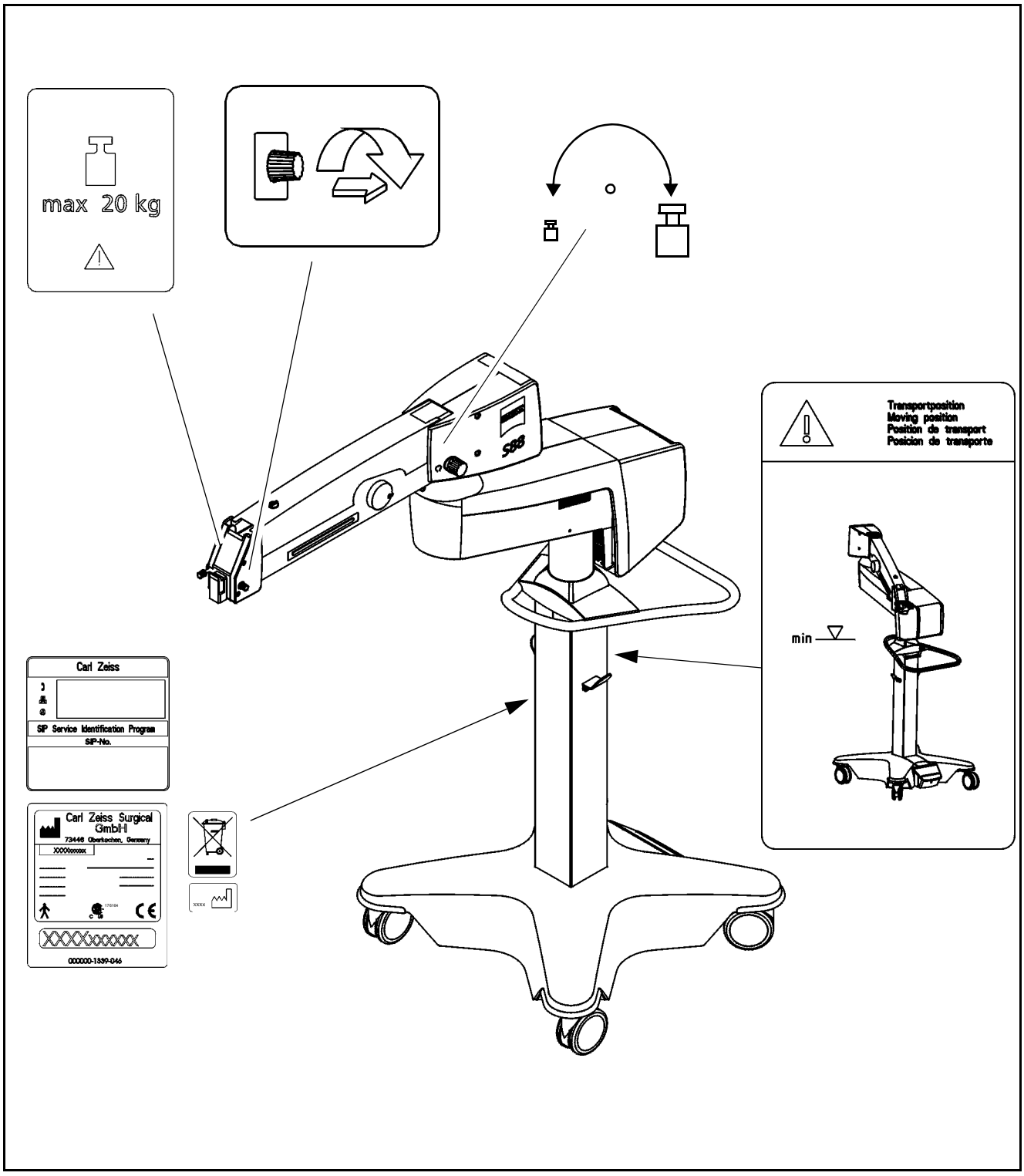
S88 floor stand



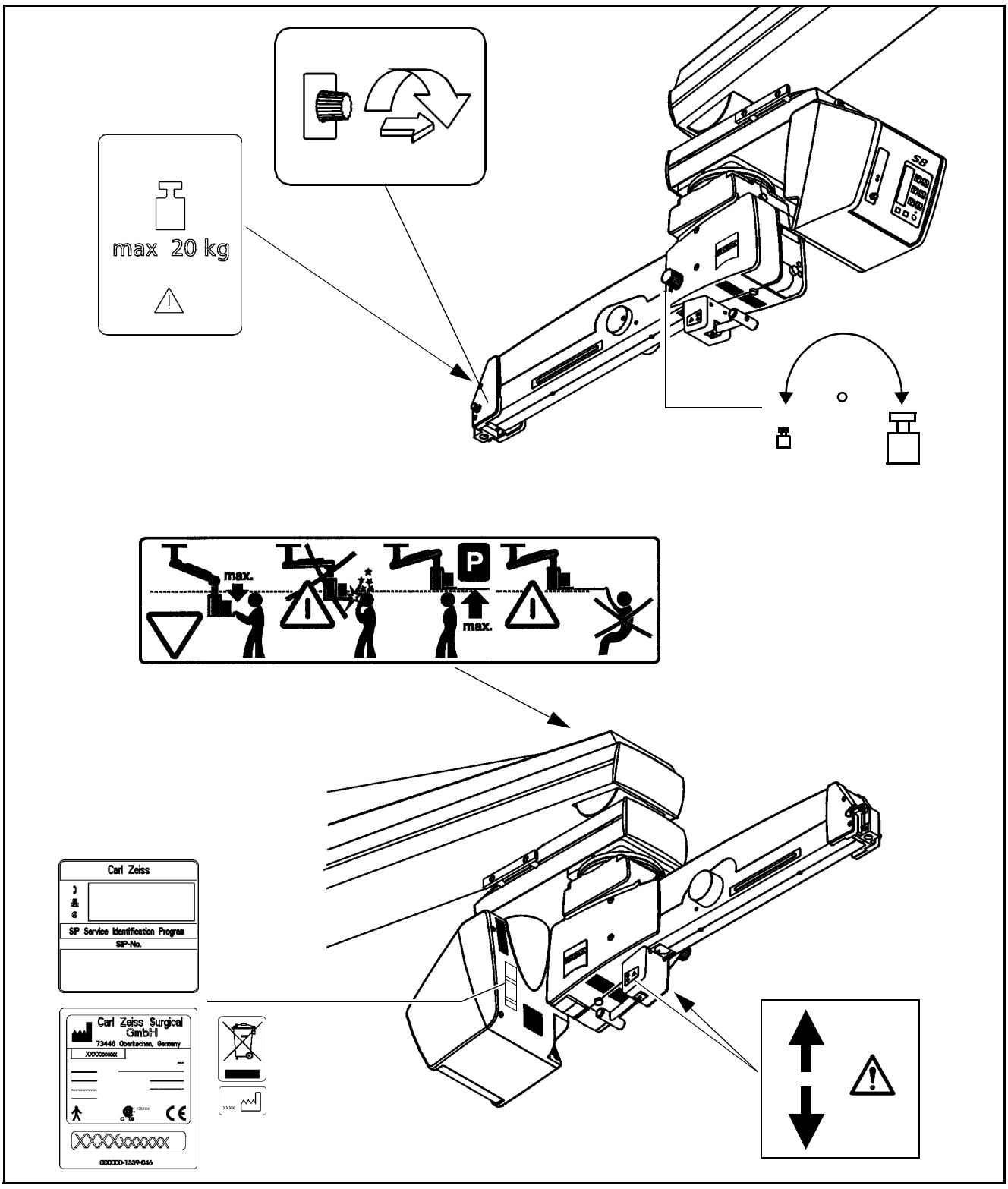
S88 floor stand with instrument tray option



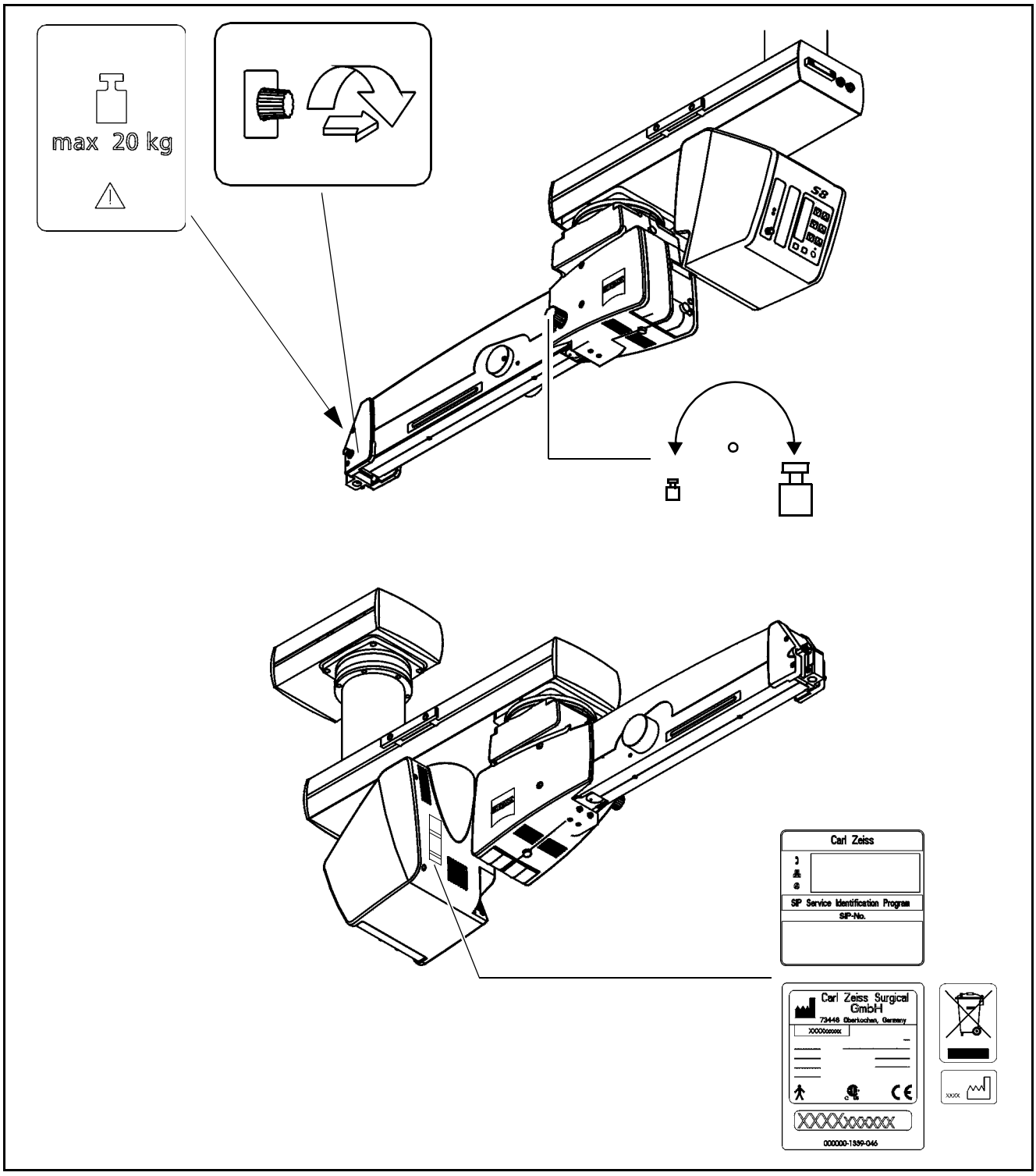
S88 floor stand with lifting column



S8 ceiling mount



S81 ceiling mount



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OPMI® VARIO surgical microscope

Intended use

The OPMI® VARIO surgical microscope has been designed for reconstructive and plastic surgery, for neurosurgery and multidisciplinary use, i.e. the device meets the special requirements made on a surgical microscope in these disciplines.

Warning!
If the xenon light source is used, the unit must not be used in ophthalmic applications. Severe injury to the patient's eye is possible.

Special properties

The apochromatic optics of the OPMI® VARIO surgical microscope provide superb optical quality. The microscope image displays optimum contrast and excellent detail recognition along with a large depth of field. An integrated, motorized Varioskop objective lens allows the working distance to the surgical field to be adjusted between 200 and 415 mm. A motorized zoom system with a 1:6 ratio provides continuous magnification adjustment. Various tubes and accessories from our range of accessories can be mounted on the standard tube port.

The support arm of the unit is provided with a balancing system; all axes of the arm are provided with magnetic brakes. Handgrips allow reliable maneuvering of the unit and the operation of major functions.

If the unit is operated on an S8/S81 suspension system, further useful functions are available:

- the magnetic brakes for almost effortless positioning,
- brightness control via the foot control panel,
- reset for XY coupling (option), focus and zoom,
- user defined basic settings for a maximum of nine users:
  - lamp brightness
  - speed for focusing, zoom and XY coupling
- programmable buttons on the foot control panel for focus memory, XY reset (option), zoom memory, camera release, triggering of an AUX signal.

Design

The OPMI® VARIO surgical microscope comprises the following modules:

1 Coupling
for mounting the surgical microscope on the suspension system.

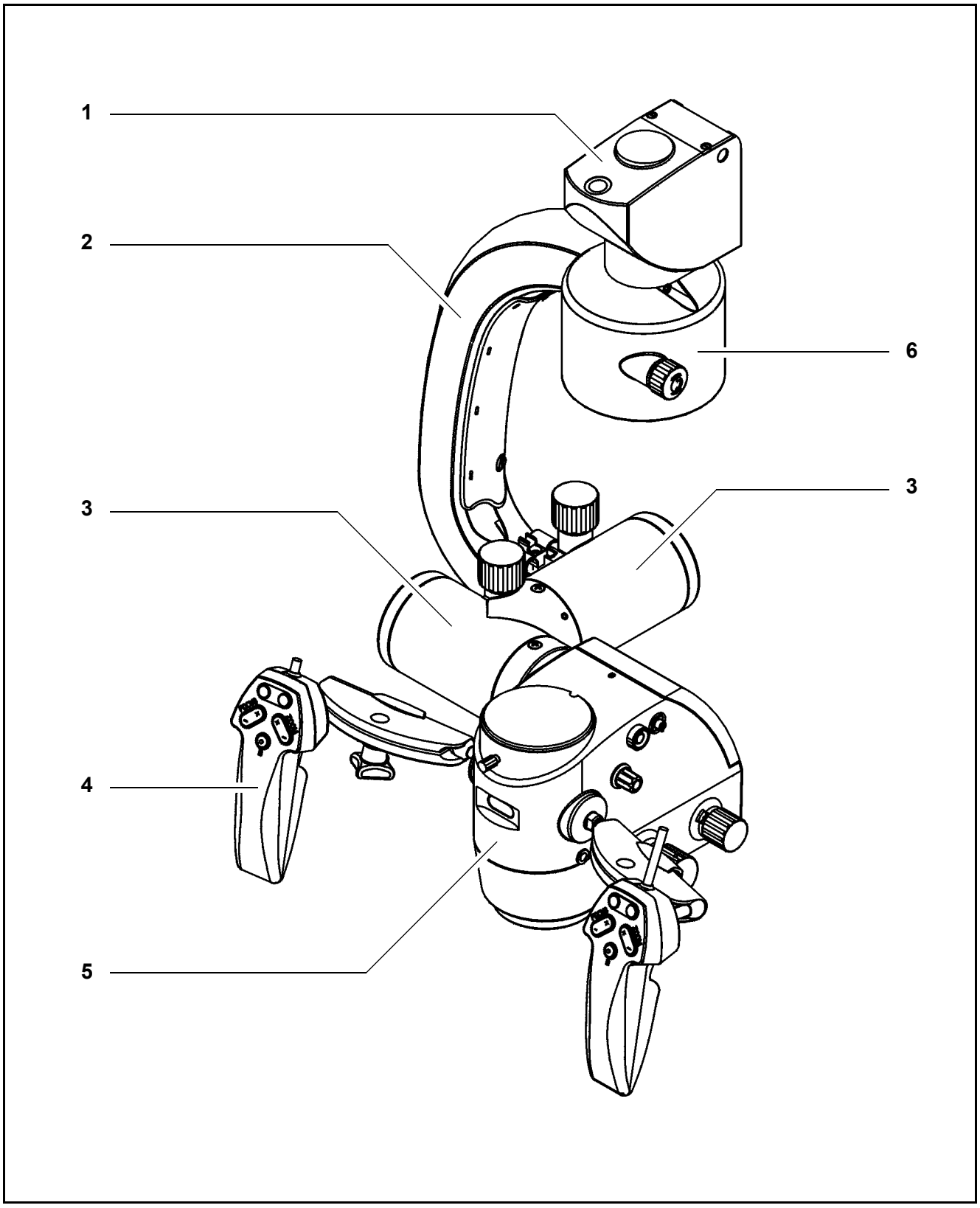
2 Support arm for surgical microscope

3 Balancing system including magnetic brakes
This system allows balancing of the surgical microscope. When the magnetic brakes are released the surgical microscope can be positioned almost effortlessly.

4 Handgrips
for moving the surgical microscope. The buttons on the handgrips permit you to control major microscope functions such as releasing/locking the magnetic brakes, focusing, zoom setting.

5 Microscope body
The apochromatic optics of the microscope provide superb optical quality. The microscope image displays optimum contrast and excellent detail recognition along with a large depth of field. The 1:6 ratio zoom system allows the magnification of the overall system to be set as required by the surgical procedure.

6 Magnetic brake
for the vertical axis.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Controls, displays, connections

1 Friction adjustment of the vertical axis
Use this knob to adjust the friction of the vertical axis as required.

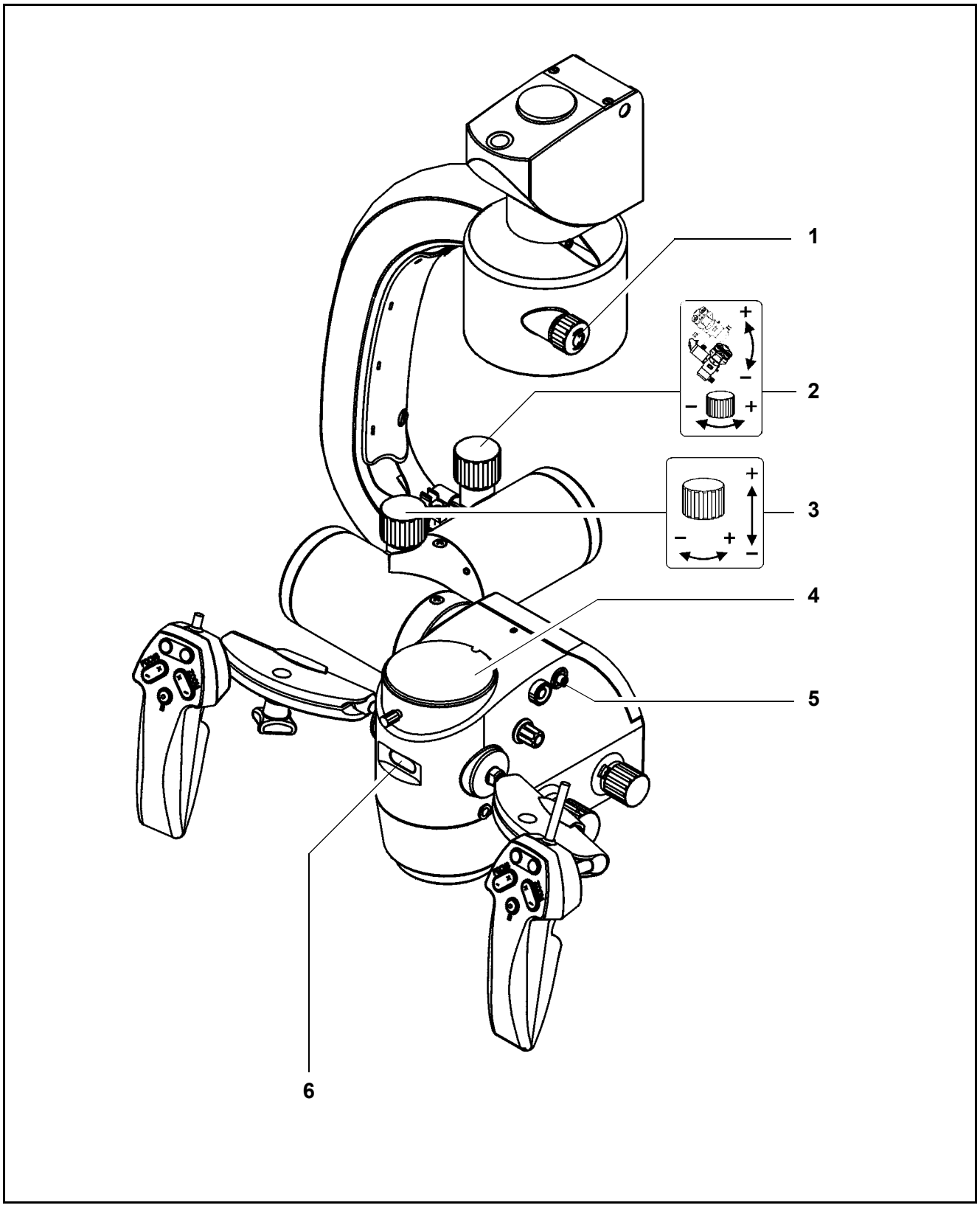
2 Balance setting of the lateral tilt motion
Use this knob to adjust the balance setting of the lateral tilt motion.

3 Balance setting of the front-to-back tilt motion
Use this knob to adjust the balance setting of the front-to-back tilt motion.

4 Dust cover

5 Mouth switch socket
You can use the mouth switch to release or lock the magnetic brakes of the suspension system used.

6 Display window
for reading off the magnification factor γ of the zoom system.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7 Focus stop button
This button permits you to deactivate the electrical drive of the focusing system. After you have pressed the focus stop button, you can only focus manually on the surgical field using knob (9). The focus stop button is lit. To release the stop, press the focus stop button again (light in the button goes out).

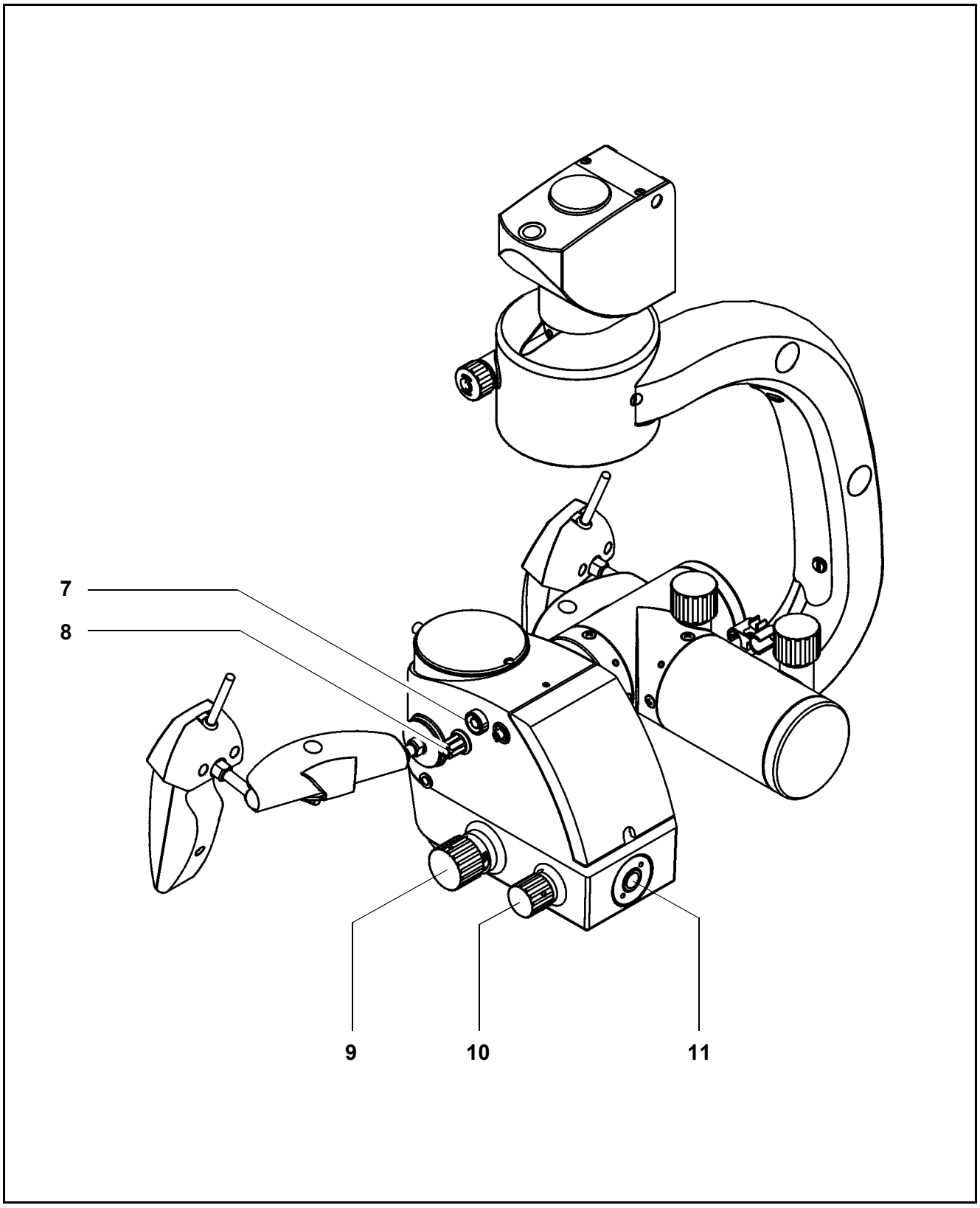
The use of a micromanipulator for laser applications is described in the section "Surgical microscope with laser micromanipulator", page 157.

8 Zoom knob
Use this knob for manual setting of the magnification.

9 Focusing knob
for manual setting of the image definition (focus, working distance)

10 Illuminated-field knob
for manual setting of the illuminated-field diameter.

11 Socket for S light guide
Insert the S light guide into the socket until it snaps in.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12 Freely programmable release buttons
Specific functions of the suspension system can be assigned to these buttons, e. g.: increasing / reducing brightness etc.

13 Zoom release button
for setting the magnification factor from 0.4x 2.4x.

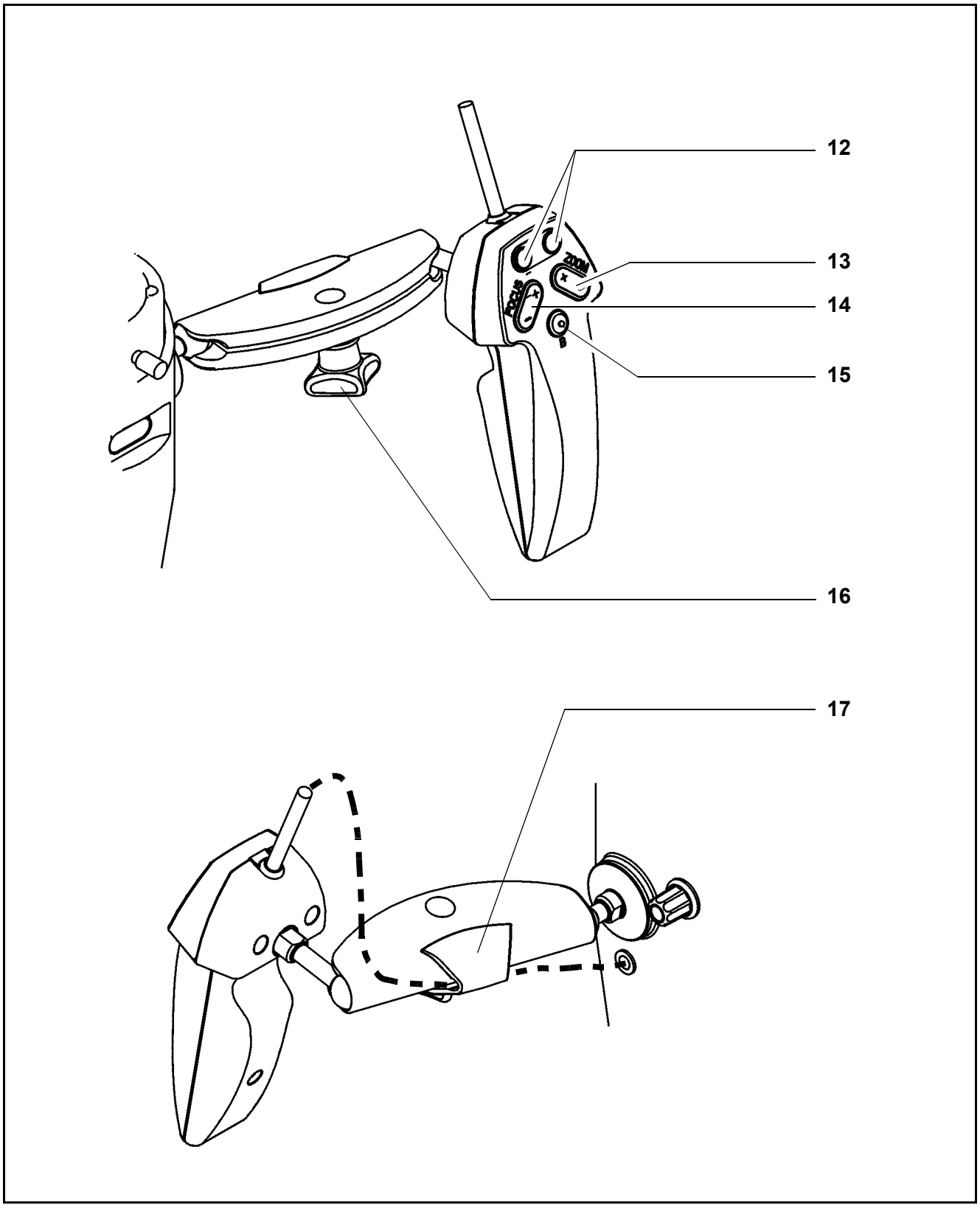
14 Focus release button
for continuous focusing within the working distance of 200 to 415 mm.

15 Release button for magnetic brakes
The magnetic brakes of the surgical microscope and suspension system are released for as long as you press this button.

16 Locking the handgrips in position
Using this screw, you can lock each handgrip in almost any position. You can swing the handgrips backward by 180° to permit a second surgeon to operate the microscope in the 180° position.

17 Cable holder

Warning!
To ensure almost effortless guidance of the surgical microscope, the surgical microscope and the suspension system used (if provided) must be correctly balanced.
If the system is in an extremely unbalanced state, the unit can move uncontrollably out of position. For this reason, hold the surgical microscope tightly at its handgrips before releasing the magnetic brakes.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X-Y coupling (option)

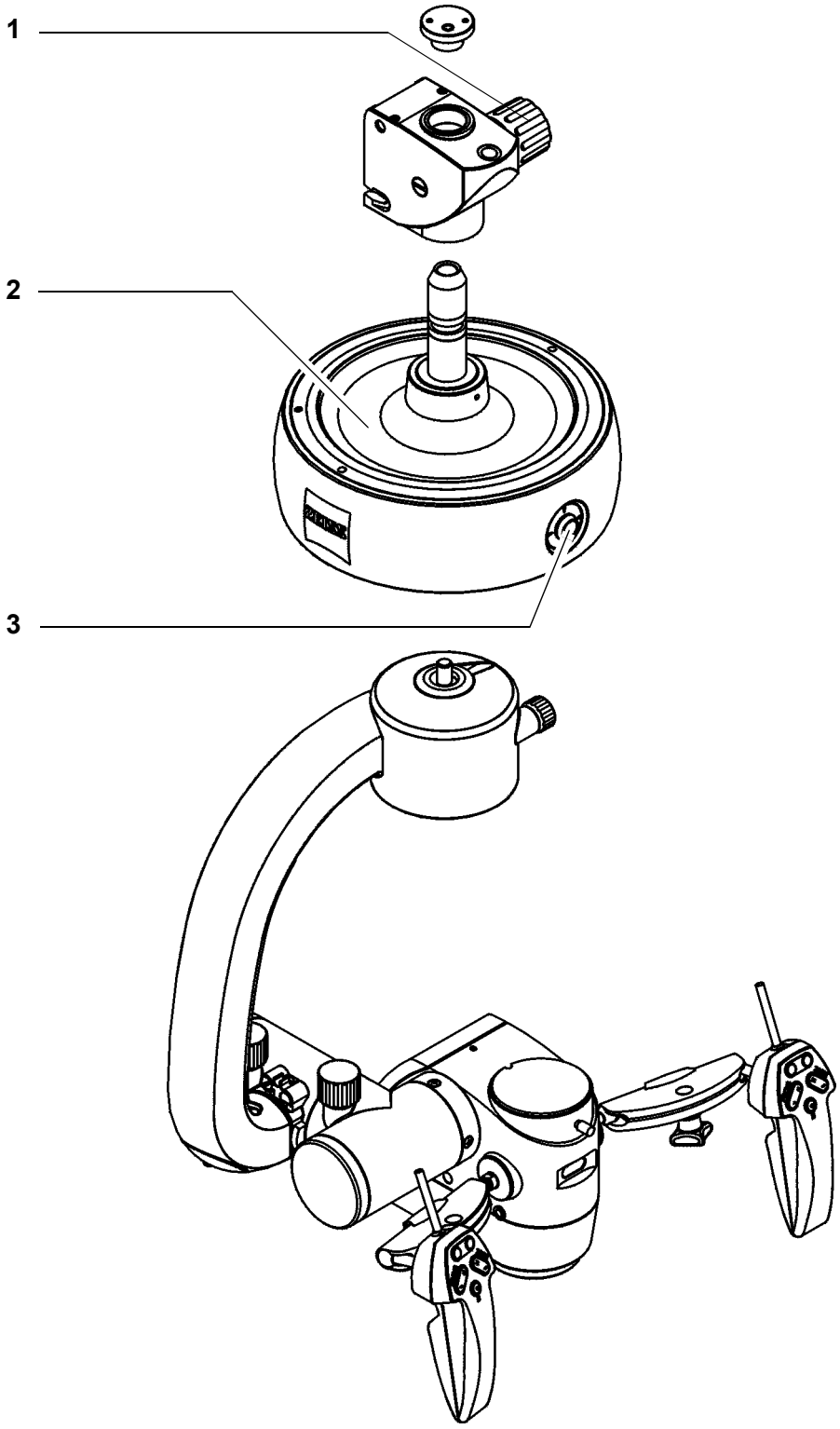
Note:

- The OPMI® VARIO can be equipped (and also retrofitted) with an X-Y coupling (2). Our service team or an authorized person will install the X-Y coupling for you.

The X-Y coupling allows motorized fine positioning of the surgical microscope in a horizontal plane. The range of travel is 40 mm x 40 mm. The speed of travel can be set on the display field of the suspension system. The X-Y coupling is provided with a recentering mechanism. When you press button (3), the X-Y coupling moves back into its center position. You can also trigger the recentering function using the freely programmable buttons on the handgrips or foot control panel.

Knob (1) permits you to adjust the friction of the microscope's rotary axis.

See also: Preparations for use / Aligning the X-Y coupling, page 138.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Binocular tubes and eyepieces

180° tiltable tube

1 PD adjustment knob
The correct position has been reached when the two eyepiece images merge into one. You can read off the interpupillary distance set on the adjustment knob.

2 180° tiltable tube

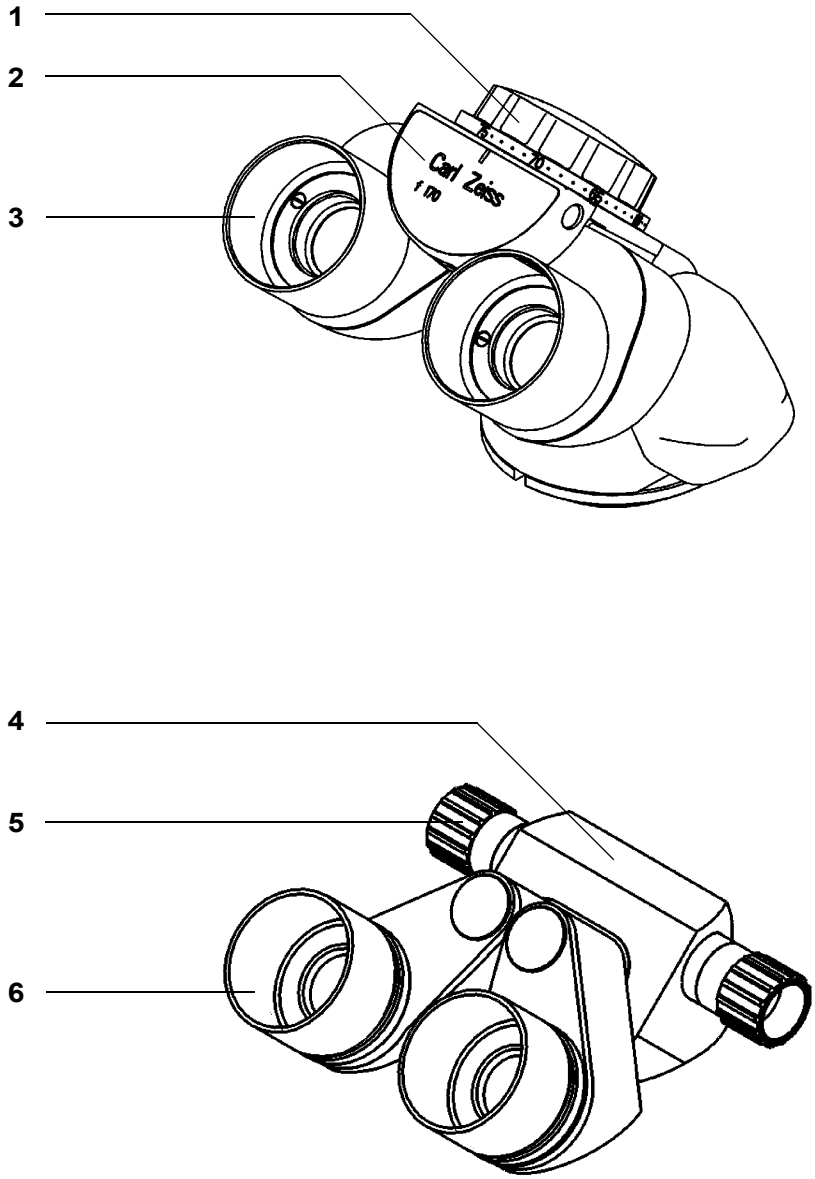
3 Eyepiece mount

45° inclined tube

4 45° inclined tube

5 PD adjustment knob
The correct position has been reached when the two eyepiece images merge into one. You can read off the interpupillary distance set on the adjustment knob.

6 Eyepiece mount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Widefield eyepieces with magnetic coupling

Note:
When you remove these eyepieces from the tube, please note that they are fitted with a magnetic coupling. When mounted, the eyepieces display a very weak magnetic field, so that the usual rules for the handling of magnets must only be observed with eyepieces which have not been mounted on the microscope:

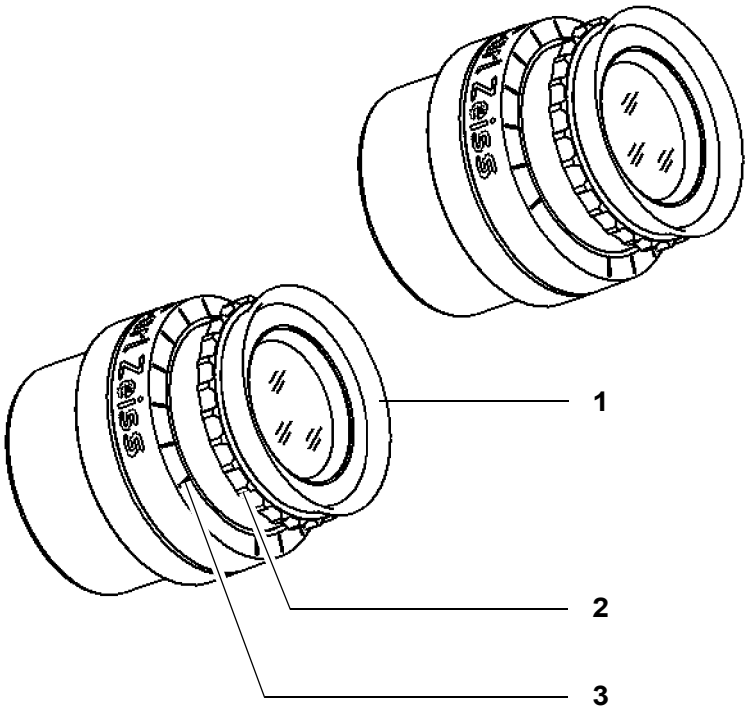
- Do not place the eyepieces close to instruments where there is any risk of magnetization.
- Do not place the eyepieces on sensitive electronic units such as infusion pumps, cardiac pace-makers, measuring instruments or magnetic data carriers such as disks, audiotapes and videotapes, or credit cards.
- Always store eyepieces not used in their original packaging.

1 Eyecup
Always adjust the eyecups in such a way that you can see the full field of view.

- Viewing with eyeglasses: Screw in the eyecups all the way.
- Viewing without eyeglasses: Screw out the eyecups until you see the full field of view.

2 Diopter adjustment ring
The eyepieces provide ametropia compensation between -8 D and +5 D. Eyeglass wearers who perform surgery wearing their glasses set the diopter adjustment ring to 0 D. Turn the ring until you have obtained the optimum setting. An integrated brake holds the ring in the position set.

3 Diopter scale
for reading the prescription set.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Xenon illumination system

Warning!
The suspension system with xenon illumination must not be used for ophthalmic procedures.

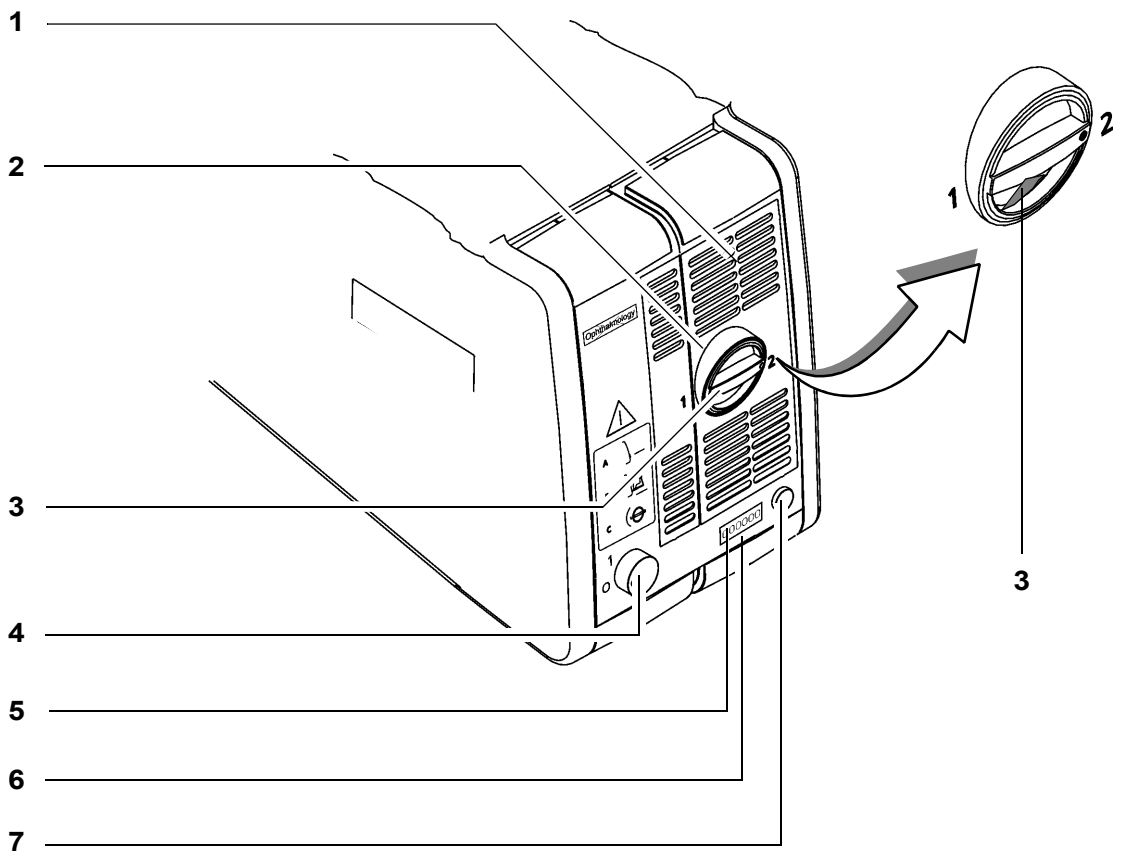
The suspension system is equipped with a xenon illumination system for fiber illumination. The xenon lamp generates light whose spectrum resembles that of natural daylight. Regardless of the brightness setting, the color temperature of the light always remains the same. Normal daylight film without any additional conversion filters can therefore be used for photographic documentation. The lamp housing contains two xenon lamps. The second lamp is used as a backup lamp which must be swung into the illumination beam path should the first lamp fail.

Ventilation grid
Do not cover the ventilation grid! For example, drapes could be covering the grid. This can cause the lamp modules to overheat and lead to lamp failure.

1 Lamp module

2 Manual activation of the backup bulb

- If the xenon bulb fails, open the lamp module as follows: Press button (7). The lamp module is slightly ejected.
- Pull out the lamp module as far as it will go.
- Turn knob (2) 180° until it snaps in place. This moves the backup bulb into the illumination beam path.
- Push the lamp module all the way back into the lamp housing.
- Reset service hour counter (5) to "0". Use a pointed object and press it into the recess of reset button (6).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Note:
When inserting a new lamp module, make sure that the knob (2) is set to "1“. If the first bulb fails, switch to the second bulb in logical sequence.

3 Indicator: backup bulb is in use
When the red segment in the knob (2) lights up, the backup bulb is in use.

4 Filter selector knob
The filter knob has two positions:

0 no filter

1 Filter swung in
(No integrated filter in the standard configuration)

5 Counter
The counter records the service hours of the xenon light source.

- Change the xenon bulbs after about 500 hours of operation to prevent them from exploding. Then reset the counter to "0" by pressing reset button (6).

6 Reset button
The reset button resets the service hour counter to "0".

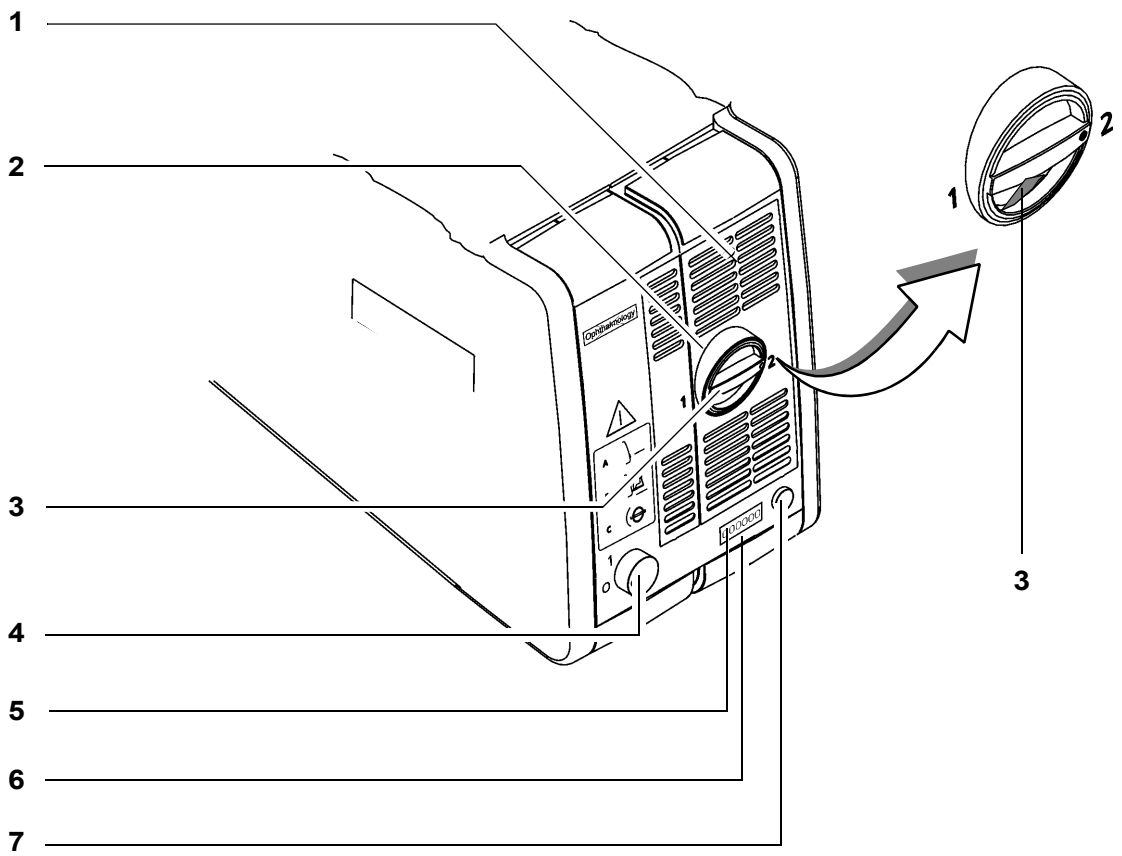
7 Opening the lamp module
When you press this button, the lamp module is slightly ejected.

- To change the bulb, pull out the lamp module as far as it will go. Turn the knob (2) 180° until it snaps in place. This moves the backup bulb into the illumination beam path.

Warning!
The xenon lamp has a limited service life of 500 h.

If used beyond its maximum service life, the xenon lamp may explode.

- Replace the xenon lamp in good time.
- Reset the service hour counter to "0" after replacing the lamp.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8 Brightness control
You can adjust the brightness using the two control keys on the control panel.

Note:
The brightness of the xenon lamp can also be adjusted by pressing the appropriate buttons on the foot control panel.

9 Yellow indicator lamp
Lights when the lamp has failed, or if the lamp module is defective. After activation and ignition of the backup lamp, the yellow indicator lamp goes out again.

Note:
If the first lamp has failed and the backup lamp is in use, make sure to have a backup lamp module ready at hand as a precaution.

10 Green indicator lamp
Lights when the illumination has been switched on.

11 Selector switch:

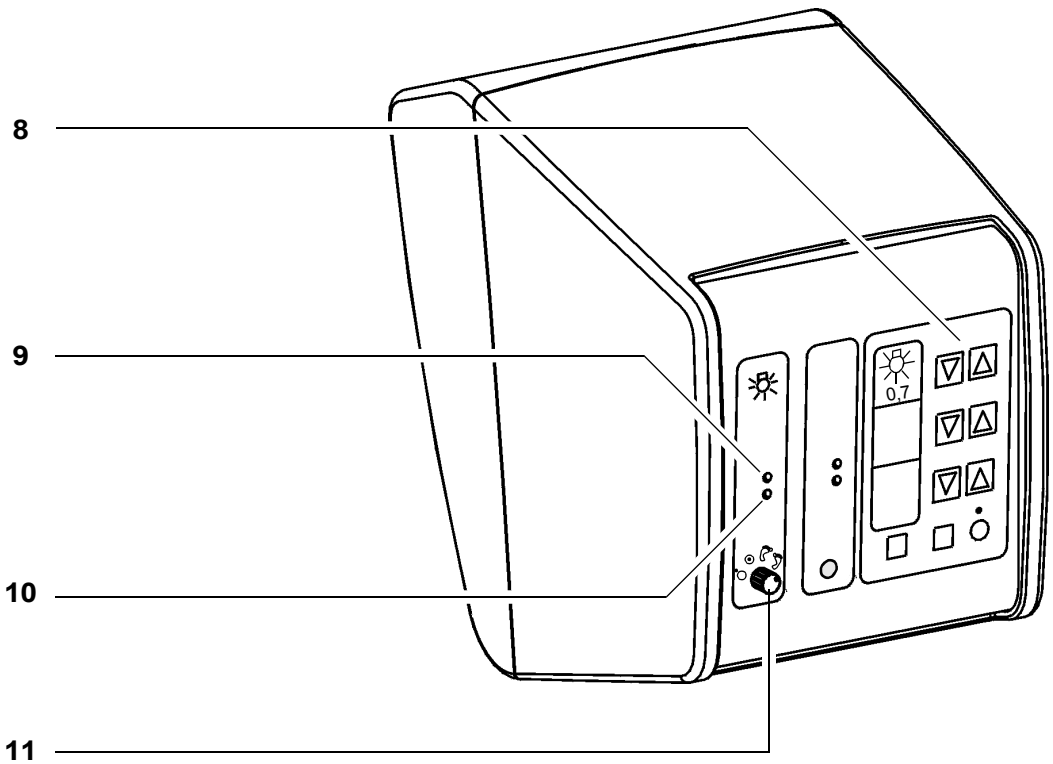
Illumination is off.

Illumination is on.

Illumination can be switched on/off on the **left-hand side** of the foot control panel.

Illumination can be switched on/off on the **right-hand side** of the foot control panel.

Note:
You can adjust the selector in such a way that you can switch the illumination on/off on the right-hand and left-hand sides of the foot control panel.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Identical modules of the suspension systems

Suspension arm

1 Lock of the cable duct

- For opening, turn a quarter turn clockwise or counterclockwise.
- For closing, press down and turn a quarter turn clockwise or counterclockwise.

2 Adjustment screw for limiting downward movement
Use this screw to set the minimum vertical working distance from the surgical field. Bring the surgical microscope into its working position. Turn the adjustment screw for limiting downward movement clockwise as far as it will go. Adjust the downward movement limitation before each surgical procedure.

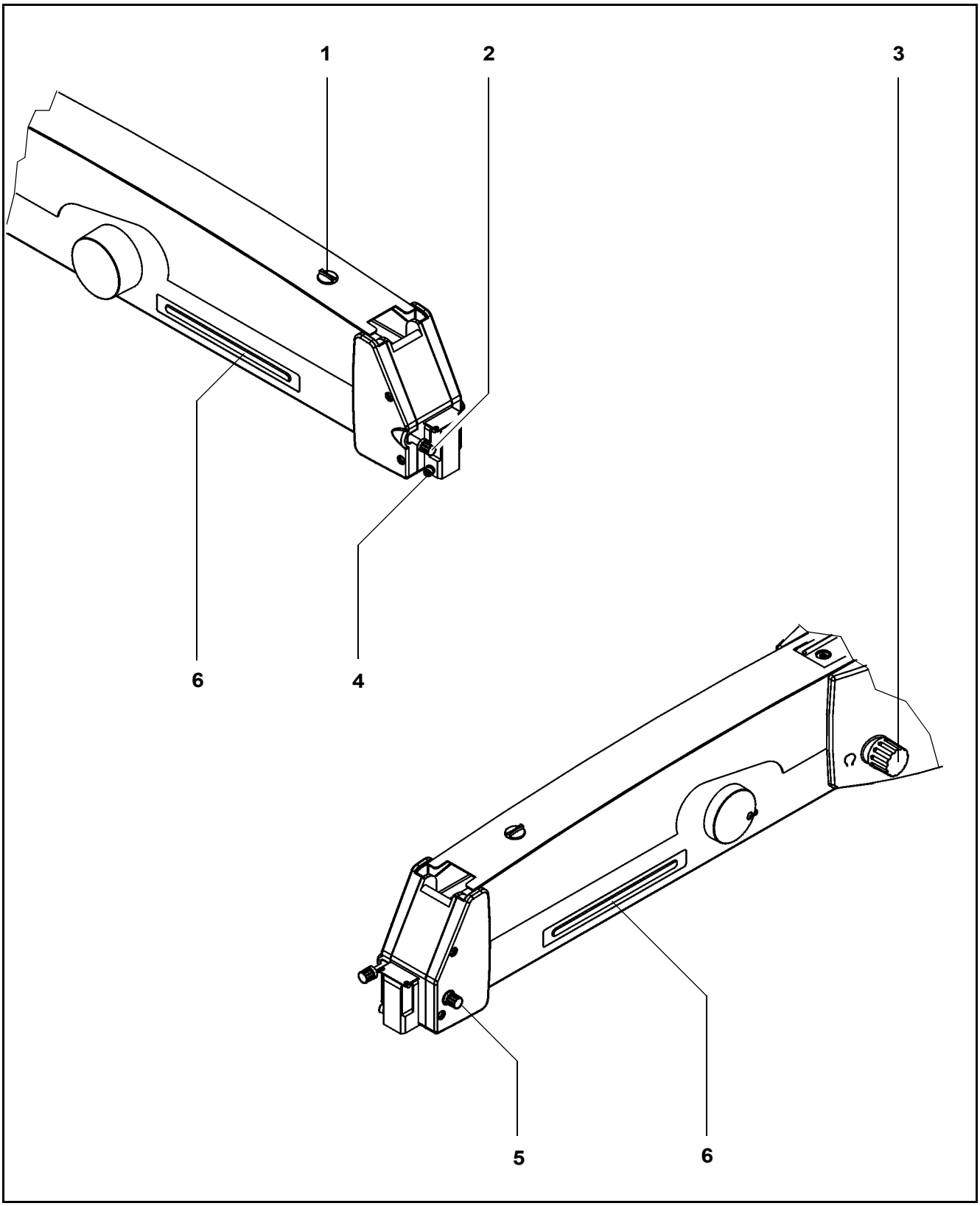
3 Balance setting screw
After mounting the surgical microscope including all accessories, adjust the balance setting of the suspension arm using this screw. Balance setting is described in detail in chapter “Operation“.

4 Securing screw
for securing the OPMI® coupling.

5 Locking knob
for locking the suspension arm in a horizontal position for mounting the surgical microscope. This prevents the suspension arm from uncontrollably moving upward when insufficient weight is attached.

6 Release bar
Allows non-sterile persons to release the magnetic brakes of the suspension system.

Magnetic brake release buttons
The magnetic brake release buttons are located on the surgical microscope. For as long as you press one of these buttons, you can move the articulated arm in all directions. When you let go of the button, the magnetic brakes will lock all axes in position at the same time.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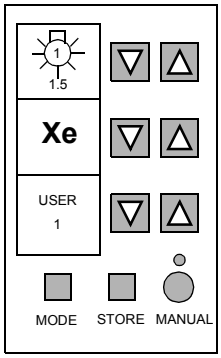
Display field with control keys

The display and control panel is integrated in the control unit.

The surgical microscope on the suspension system can be controlled either manually or electronically. The control software required for electronic control is installed in the electronics box of the suspension system. You operate the software via the control and display panel, where you can read off and reconfigure the current settings.

Basic mode



The control and display panel is structured as follows:

– Three display fields (LCD) with the associated keys "∇" and "Δ".
– One row of keys comprising the MODE, STORE and MANUAL keys, and a yellow LED above the MANUAL key.

User interface

The user interface of the suspension system comprises three display fields and keys located beside and below them.
A pair of keys "∇" and "Δ" has been assigned to every display field for making the appropriate settings.

The control functions have been combined in several modes (menu pages). The basic mode is always displayed in the normal operating status.

The following is displayed in the basic mode:

– the current lamp brightness of lamp 1 (xenon) in the upper display field,
– Xe for xenon in the middle display field,
– the current user ID in the lower display field.

Key row

Three keys and an LED are provided below the display fields.
Use the "MODE", "STORE" and "MANUAL" keys to select the different control functions (modes).

"MODE" key and "STORE" key
The "MODE" and "STORE" keys permit you to access the different modes of the user interface. For details, please see the chapter "Operation".

"STORE" key
Use the "STORE" key to save the current focus and zoom settings.

"MANUAL" key
The "MANUAL" key permits you to switch to manual operation. For details, please see the chapter "Operation".

Yellow LED above the "MANUAL" key
The yellow LED is lit when you have switched to the manual mode.

S88 floor stand

Intended use

The S88 floor stand is a carrier system for the surgical microscope. It is used to power and control the motorized functions of the surgical microscope. The hallmarks of the floor stand are its superb mobility and easy operation. Four steerable casters on the stand base permit easy positioning in the OR. The motorized functions of the surgical microscope can be activated using a foot control panel.

Further useful functions include, for example:

– magnetic brakes for almost effortless positioning,

– brightness control via a foot control panel,

– reset of X-Y coupling, focus and zoom,

– user-defined basic settings for a maximum of nine users:

  – speeds for focus, zoom and X-Y coupling

  – and configurable buttons on the foot control panel for focus memory, XY inversion, camera release, swinging SDI in/out, triggering an AUX signal.

Warning!
The suspension system with xenon illumination must not be used for ophthalmic procedures.

Description of the modules

The floor stand comprises an articulated arm, a stand column and a stand base. The articulated arm comprises a carrier arm and a suspension arm. The carrier arm contains the control unit with all electrical supply systems required for the control of a motorized surgical microscope. These motorized functions can be activated using a foot control panel.
The suspension arm permits almost effortless positioning of the surgical microscope. The spring force of the suspension arm can be varied in a range from 8 to 20 kg, permitting reliable balancing of the microscope even with heavy accessory equipment. The downward movement of the suspension arm can be limited as required.
A maneuvering handle attached to the stand column is used to move the stand and to attach the foot control panel. The stand column is provided on its left and right with cable supports for winding up cables before the unit is relocated. Four steerable casters on the stand base permit easy positioning near the operating table. The stand base has been designed in such a way that high stability is ensured even with unfavorable loading of the stand. A locking pedal is provided to lock the floor stand quickly and reliably into position.

Caution:

As the stand is very easy to maneuver, there is a tendency to underestimate its considerable weight. Therefore, move the stand slowly and carefully!

Design

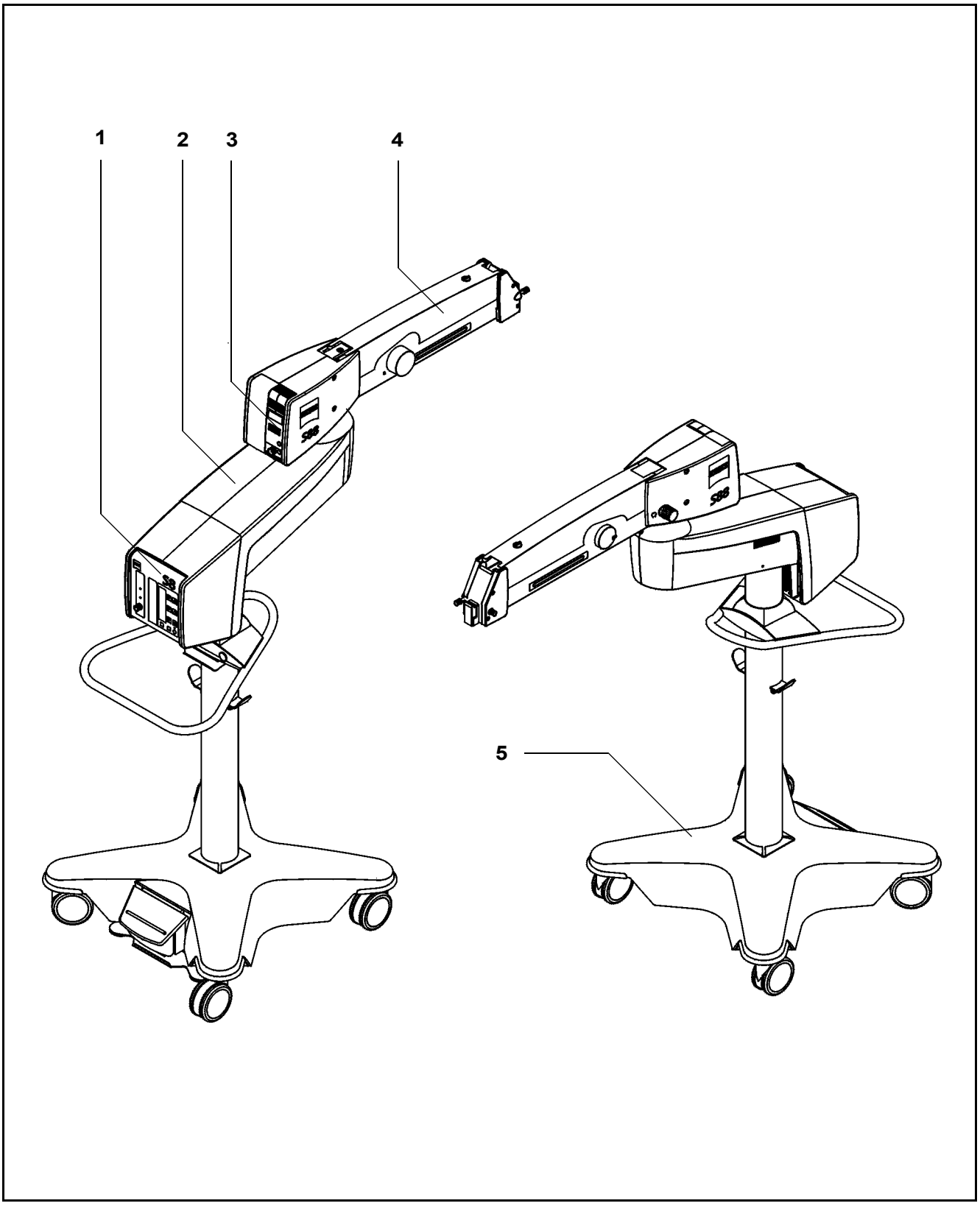
1 Control panel

2 Carrier arm

3 Xenon illumination system, see Seite 1

4 Suspension arm

5 Stand base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Stand base with column

1 Handle
for moving the stand.

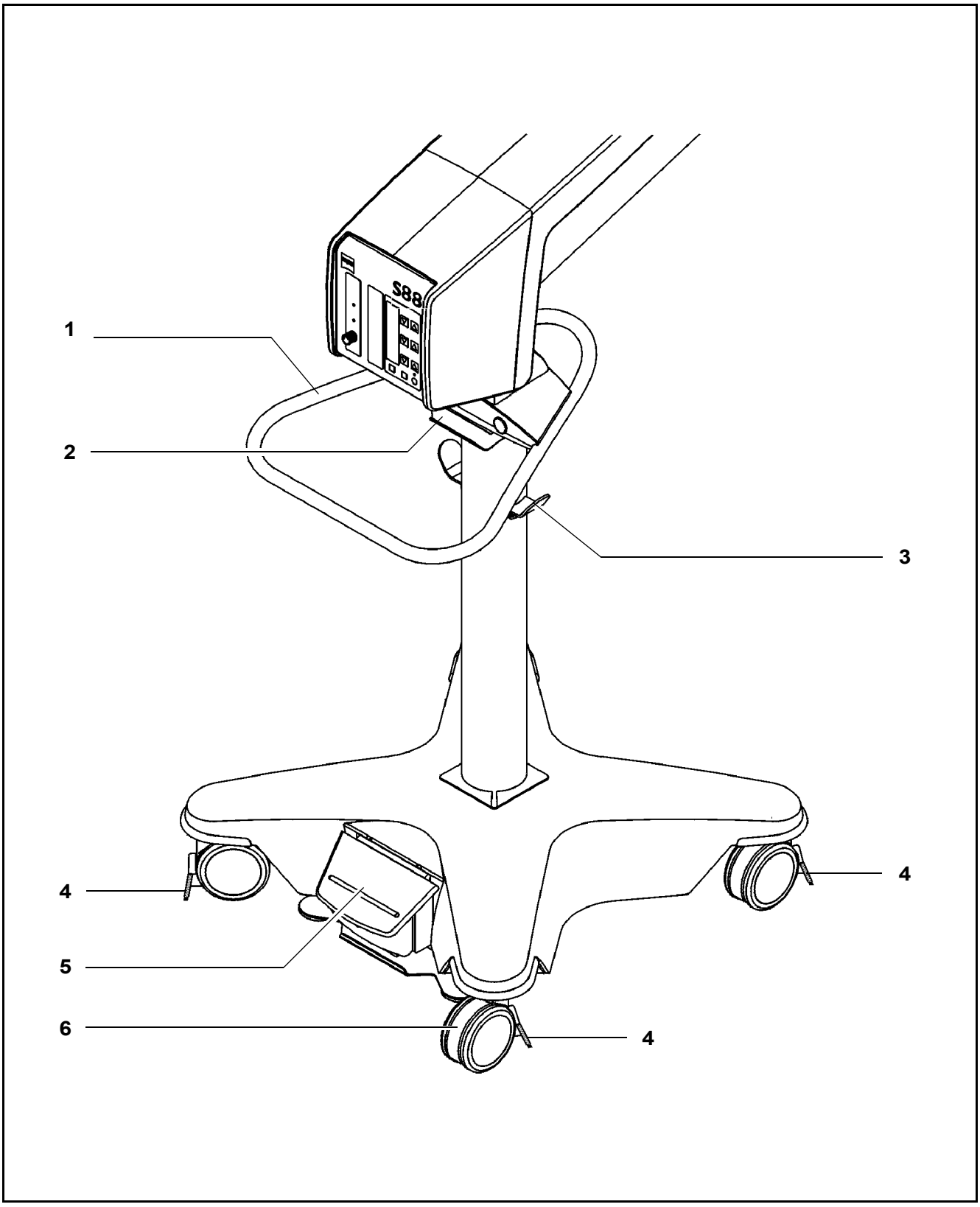
2 Support
for hanging up the foot control panel during transport.

3 Cable support (2x)
for winding up the power cord and the cable of the foot control panel.

4 Cable deflectors
are provided to prevent cables on the floor from being run over and damaged.

5 Locking pedal
Press once to lock the stand in position.
Press a second time to release the locking pedal.

6 Steerable casters
The four steerable casters on the stand base permit easy positioning in the OR.


S88
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Connection panel

1 Remote socket
for triggering an AUX signal, e.g. to switch on/off an external device operating at max. 24V/0.5A.

2 Connector for switching component
Possibility of connecting a foot control panel or operating chair with an appropriate footswitch.

3 Potential equalization connector

4 Indicator window for rated voltage
The voltage shown here must correspond to the rated line voltage provided on the site of installation. You can adjust the sliding switch using a suitable tool.

Warning!
Please observe the maximum current consumption of two power outlets (5) and (6). Only connect medical devices approved by us to outlets (5) and (6). When using other devices, make sure that safety is guaranteed regarding admissible ground leakage currents. The admissible limit value of the ground leakage current present in the suspension system's power cord must not exceed 500 µA in compliance with EN60601-1/IEC 60601-1. CSA/US certification in compliance with UL 60601-1 only allows a maximum ground leakage current of 300 µA.

5 Power outlet
for medical devices with a current consumption of max. 2 A.

Note:
The current of this power outlet is switched on/off using power switch S2 (8).

6 Power outlet socket
for medical devices with a current consumption of max. 5 A.

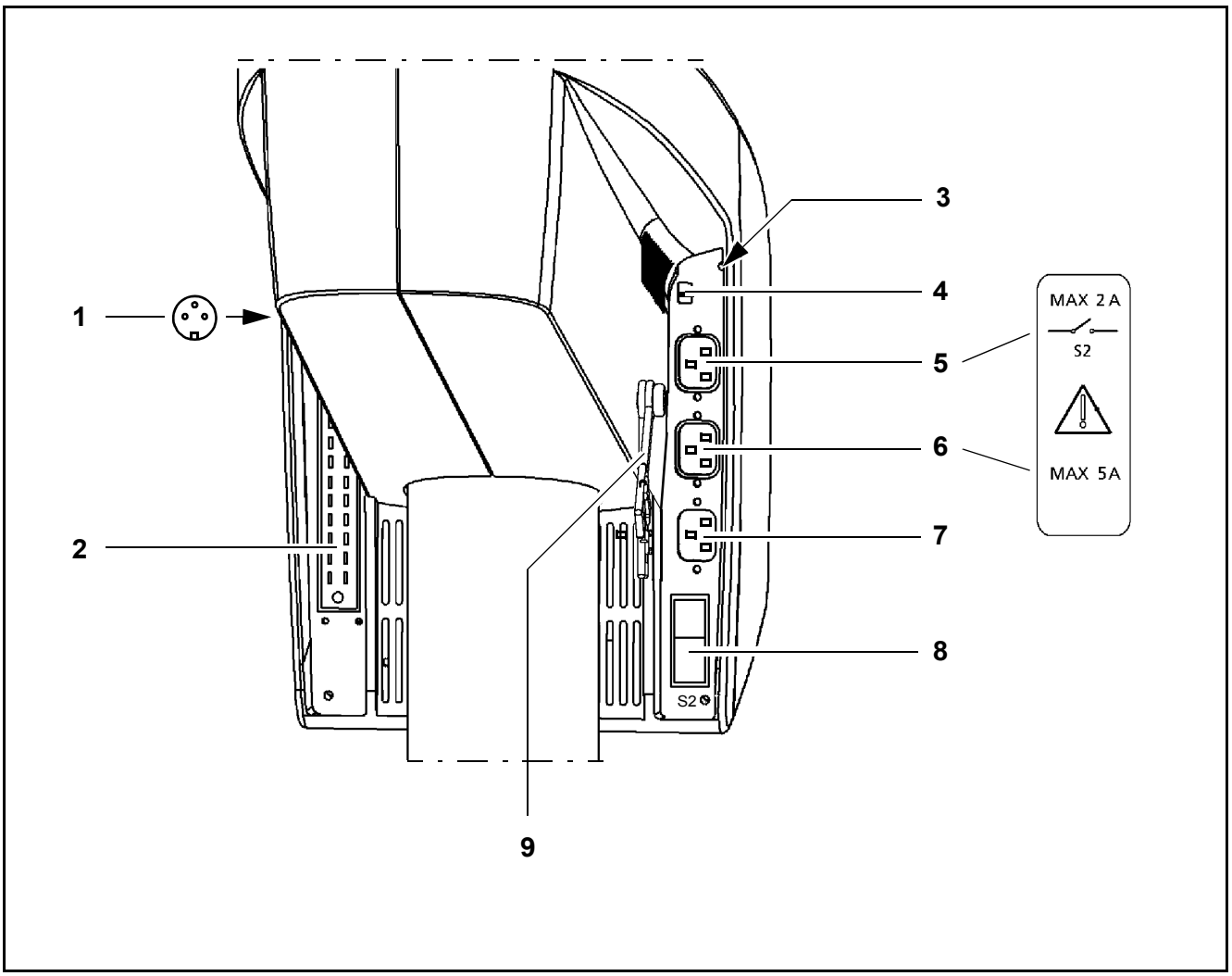
7 Power inlet socket

8 Power switch S2
When the suspension system is on, the green indicator light in the switch is lit.

9 Strain relief device
The strain relief device prevents inadvertent unplugging of the following electrical connections:

– power cable,

– connecting cable for foot control panel or operating chair with appropriate footswitch.



Instrument tray (option)

The S88 floor stand and the S88 floor stand with lifting column an be equipped or retrofitted with an instrument tray. In the case of retrofitting, our service staff or an authorized person will install the instrument tray on your suspension system.

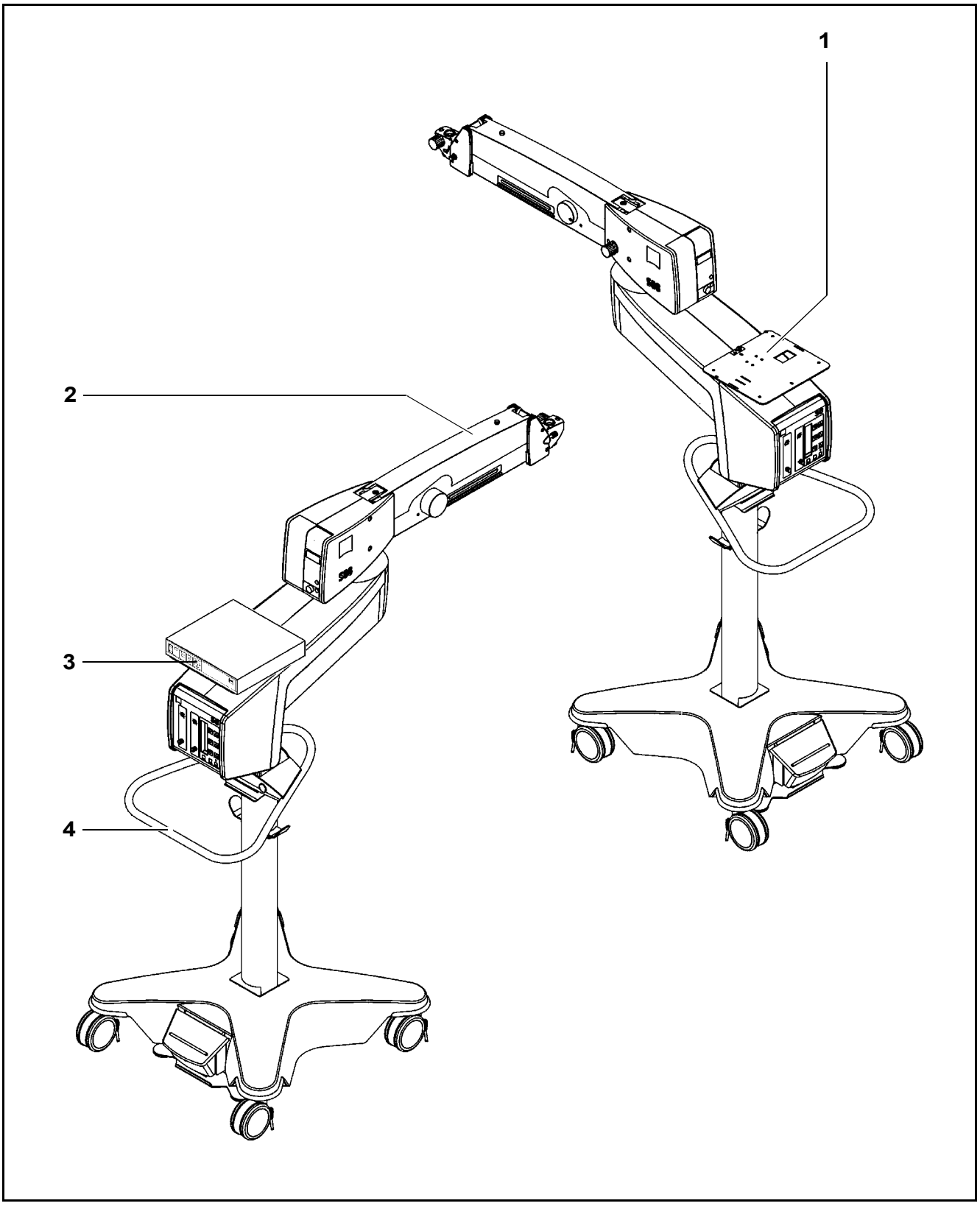
The instrument tray (1) can carry a maximum of 13 kg. The tray has been designed, for example, for mounting MediLive Trio from Zeiss:

The MediLive Trio is attached to the instrument tray with the aid of two stud bolts. (The four receptacles supplied with the instrument tray are not required for mounting MediLive Trio.)

A second MediLiveTrio or other accessory equipment can be mounted on the instrument tray using the strap provided. Please note the instrument tray's maximum load capacity of 13 kg.

Warning!

- Make sure that the accessory equipment is positioned as securely as possible on the instrument tray.
- Mount MediLive Trio on the instrument tray using the two stud bolts.
- If required, secure further accessory equipment on the tray using the strap provided.
- Do not place a load of more than 13 kg on instrument tray (1).
- Remember there is a risk of collision and crushing when suspension arm (2) is folded to its moving position. A "Risk of crushing" warning label is therefore attached on the left and right of suspension arm (2).
- Please read the relevant user manual before starting up the accessory equipment.
- Never pull or push at the accessory equipment (3) in order to move the S88 floor stand. Always use handle (4) to move the S88 floor stand.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Video monitor (option)

The S88 floor stand and the S88 floor stand with lifting column an be equipped or retrofitted with a TFT monitor. In the case of retrofitting, our service staff or an authorized person will install the TFT monitor on your suspension system.

The TFT monitor (1) features a 15" screen and permits the scrub nurse and other OR staff to follow the surgical procedure. For optimum viewing, the TFT monitor can be precisely positioned using flexible arm (2).

Warning!
Risk of injury due to lowering of the TFT monitor!

- Ageing processes may lead to the loss of gas in the gas pressure spring of the monitor's suspension arm, causing the TFT monitor to move downward of its own accord.
- Compensate for the loss of gas by readjusting the gas pressure spring as described on page 218.

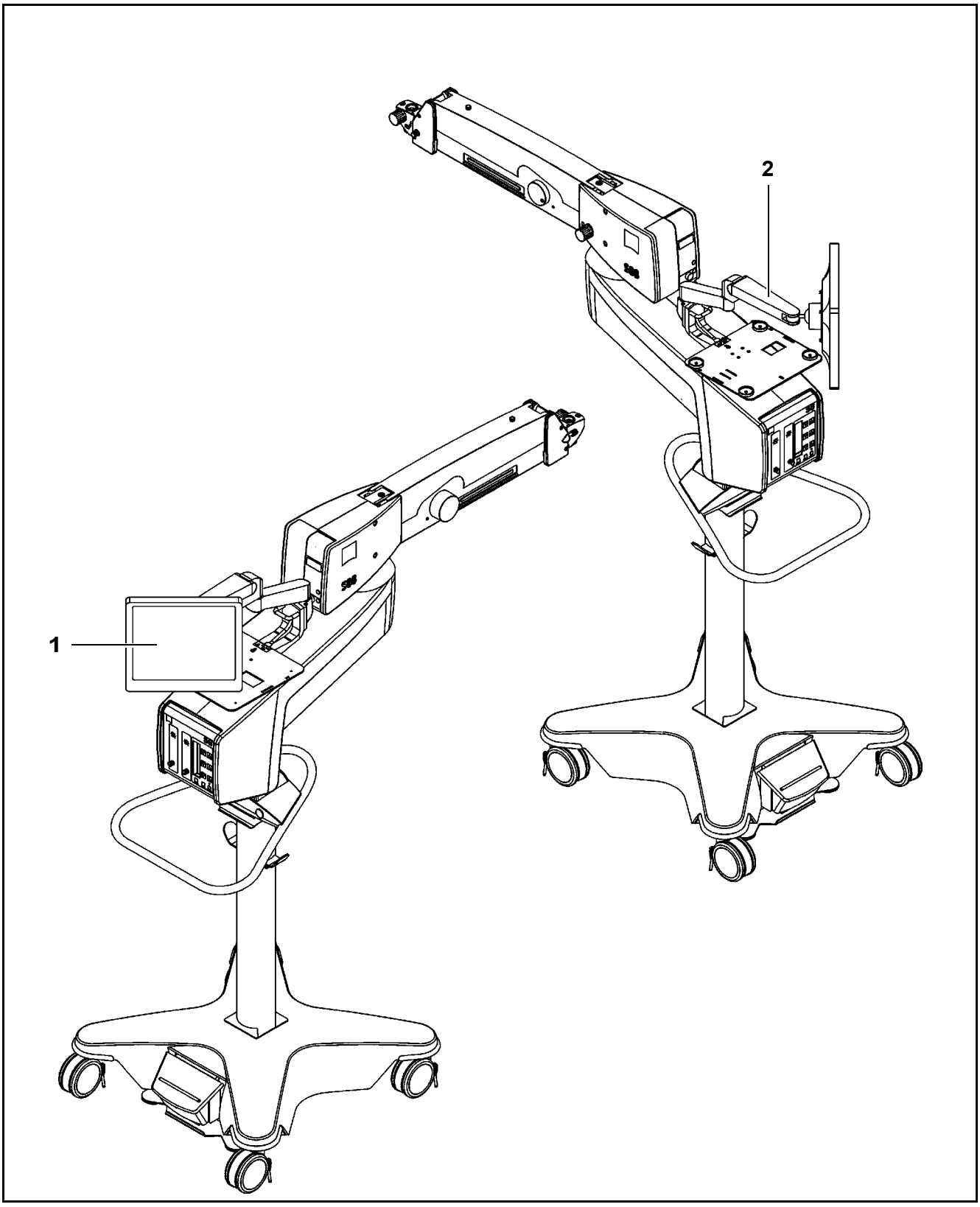
If the TFT monitor continues to move downward, the gas pressure spring is defective.

- Notify our service representative.

Warning!
Do not use the stored video sequences, video clips (cut sequences) and single images for diagnostic purposes, as the video cameras and the monitor have not been calibrated. The visualized images may therefore include deviations in scale, color and shape.

This applies in particular if the sequences, clips or images are viewed on a monitor outside the OR, as the transmission to a different monitor may lead to changes in the display.

Note:
The background illumination of the LCD display has a limited service life. If you notice that the display is getting darker or starts to flicker, contact your Zeiss dealer.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Components

The principal component of the TFT monitor is the 15" screen which delivers flawless, sharp images even at low frame rates of 50 Hz.

The connectors and controls are located under cable cover (2) on the back of the TFT monitor. To access the connectors and controls, proceed as follows:

- Remove two screws (3) from cable cover (2) by turning them counterclockwise.
- Remove cable cover (2) by pushing it upward.

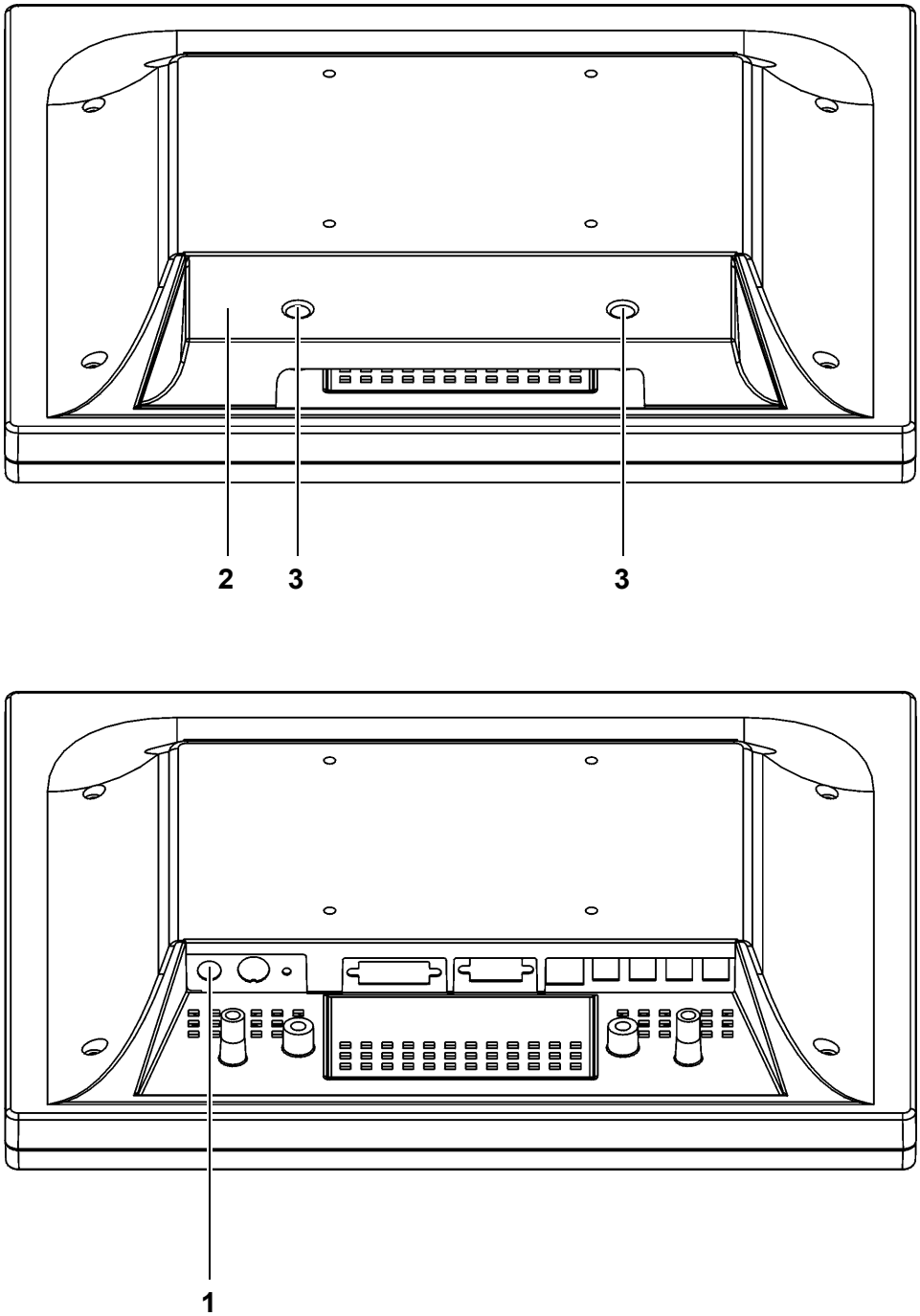
Controls

1 Auto Adjust button
The Auto Adjust function permits automatic image adjustment of the TFT monitor to obtain a sharp, optimally positioned image. Perform the automatic adjustment when initially starting up the TFT monitor or after making any changes to the system.

Note:

– The Auto Adjust function can only be executed if a VGA signal source is connected.

– Always use a normal camera image for automatic image adjustment. Do not use the test image which is displayed directly after power-on or when no camera head is connected.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Connector panel

2 Power supply
for power and voltage supply of the device.

Caution:
Only operate the device with the power cable included in the delivery package.

3 DVI connector
DVI stands for Digital Video Interface and is the latest technology for digital data transmission. The cable length for this connector must not exceed 4.5 m.

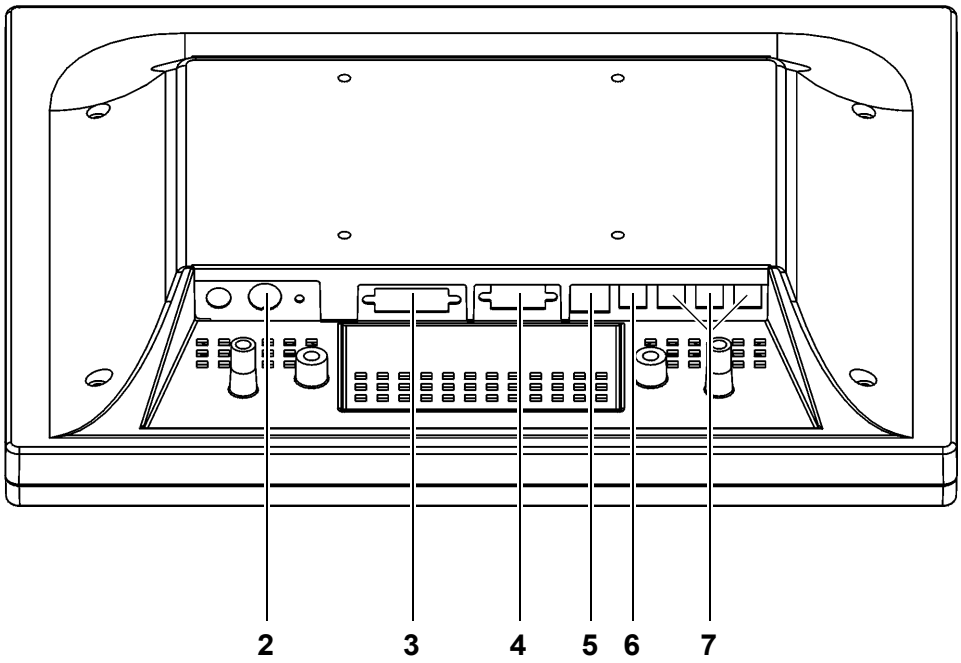
Note:
We recommend the DVI connector for the connection of a camera, as it delivers optimum image quality with minimum flicker. The DVI cable is included in the delivery package.

4 VGA connector
VGA stands for Video Graphics Array and is an analog interface for video data transmission between graphics cards and display devices.

5 S-Video connector
S-Video - also known as separate video or Y/C - is an analog interface that transmits brightness and color information as separate signals. This standard provides higher video image quality than Composite Video. The maximum cable length for this connector should not exceed 10 m. For longer cables, please use the Composite Video connector.

6 Composite Video connector (1x cinch)
This is an analog interface that transmits the composite video signal via a single channel (yellow cinch connector). This connector is particularly suitable for transmitting video signals over long distances.

7 Component connector (3x cinch)
This is an analog interface that transmits the component video signal via three channels (red, yellow, green cinch connector). Each channel transmits one of the primary colors.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Powering on the TFT monitor

To facilitate the operation of the TFT monitor, it is automatically activated when the suspension system is switched on.

During the power-on process, the TFT monitor executes a power-on sequence in which the signals on the connectors (DVI, VGA, S-Video, Composite and Component) are checked. After detection of the signal available, the correct screen resolution and frame rate are set automatically.

Note:
If a signal source is present at the VGA connector, the image settings can be optimized using the Auto Adjust function as described on page 88.

Aligining the video monitor

The best visualization is obtained when you are looking straight at the screen of the TFT monitor.

- Swivel the monitor's carrier arm (1) and suspension arm (2) into the horizontal position required.

Caution:
Take care not to damage the video cable!
Do not swivel the suspension arm beyond ±120°.

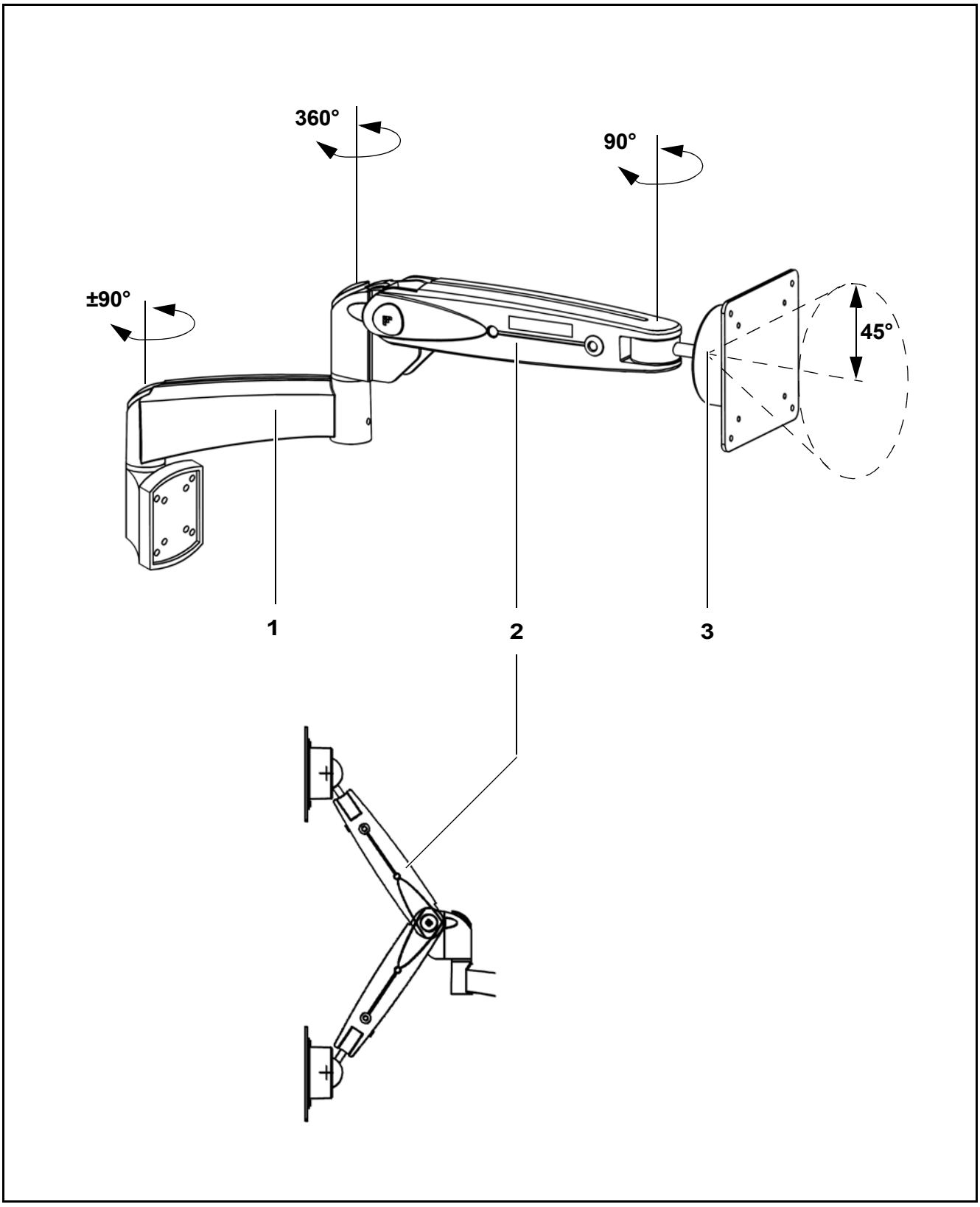
- Tilt the suspension arm (2) upward or downward until the required height has been reached.
- Hold the upper corners of the TFT monitor and adjust it to the required angle via ball joint (3).

Warning!
Risk of injury due to lowering of the TFT monitor!

- Ageing processes may lead to the loss of gas in the gas pressure spring of the monitor's suspension arm, causing the TFT monitor to move downward of its own accord.
- Compensate for the loss of gas by readjusting the gas pressure spring as described on page 218.

If the TFT monitor continues to move downward, the gas pressure spring is defective.

- Notify our service representative.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S88 floor stand with lifting column

Intended use

The floor stand is a carrier system for Zeiss surgical microscopes for almost all surgical disciplines. It is used to power and control the motorized functions of a surgical microscope. The hallmarks of the floor stand are its superb mobility and easy operation. A motorized lifting column permits the viewing height to be perfectly matched to the surgeon's requirements. Four steerable casters on the stand base permit easy positioning in the operating area. The motorized functions of the surgical microscope can be controlled using a foot control panel or hand control panel.

Further useful functions include for example:

- the magnetic coupling for almost effortless positioning,
- fully automatic change of the halogen lamp,
- brightness control via the foot control panel,
- resetting the X-Y coupling, focus and zoom,
- user-defined basic settings for a maximum of nine users:
  - Lamp brightness
  - speeds for focus, zoom and X-Y coupling
  - and configurable keys at the foot control panel for focus memory, XY-inversion, camera triggering, swing in/out of SDI, triggering the AUX signal.

Warning!
The suspension system with xenon illumination must not be used for ophthalmic procedures.

Description of the modules

The S88 floor stand comprises the articulated arm, the motorized stand lifting column and the stand base. The articulated arm comprises a carrier arm and a suspension arm.
The carrier arm contains the control unit with all electrical supply systems required for the control of a motorized surgical microscope. You can control the motorized functions via a foot control panel or a hand control panel.
The suspension arm permits almost effortless positioning of the surgical microscope. The spring force of the suspension arm can be varied in a range from 8 to 20 kg, permitting reliable balancing of the microscope even with heavy accessory equipment. The downward movement of the suspension arm can be limited as required.
The height of the stand column can be set via a motorized function. The lifting column allows the continuous positioning of the surgical microscope within a lifting range of 530 mm to set the optimum viewing height of the microscope or to move downwards into the transport position. A maneuvering handle attached to the stand column is used to move the stand and to attach the foot control panel. The stand column is provided on its left and right with cable supports for winding up cables before the unit is relocated. Four steerable casters on the stand base permit easy positioning near the operating table. The stand base has been designed in such a way that high stability is ensured even with unfavorable loading of the stand. A locking pedal permits the S(floor stand to be locked in position quickly and reliably.

Note:
As the stand is very easy to maneuver, there is a tendency to underestimate its considerable weight. Therefore, move the stand slowly and carefully!

Design

1 Control unit

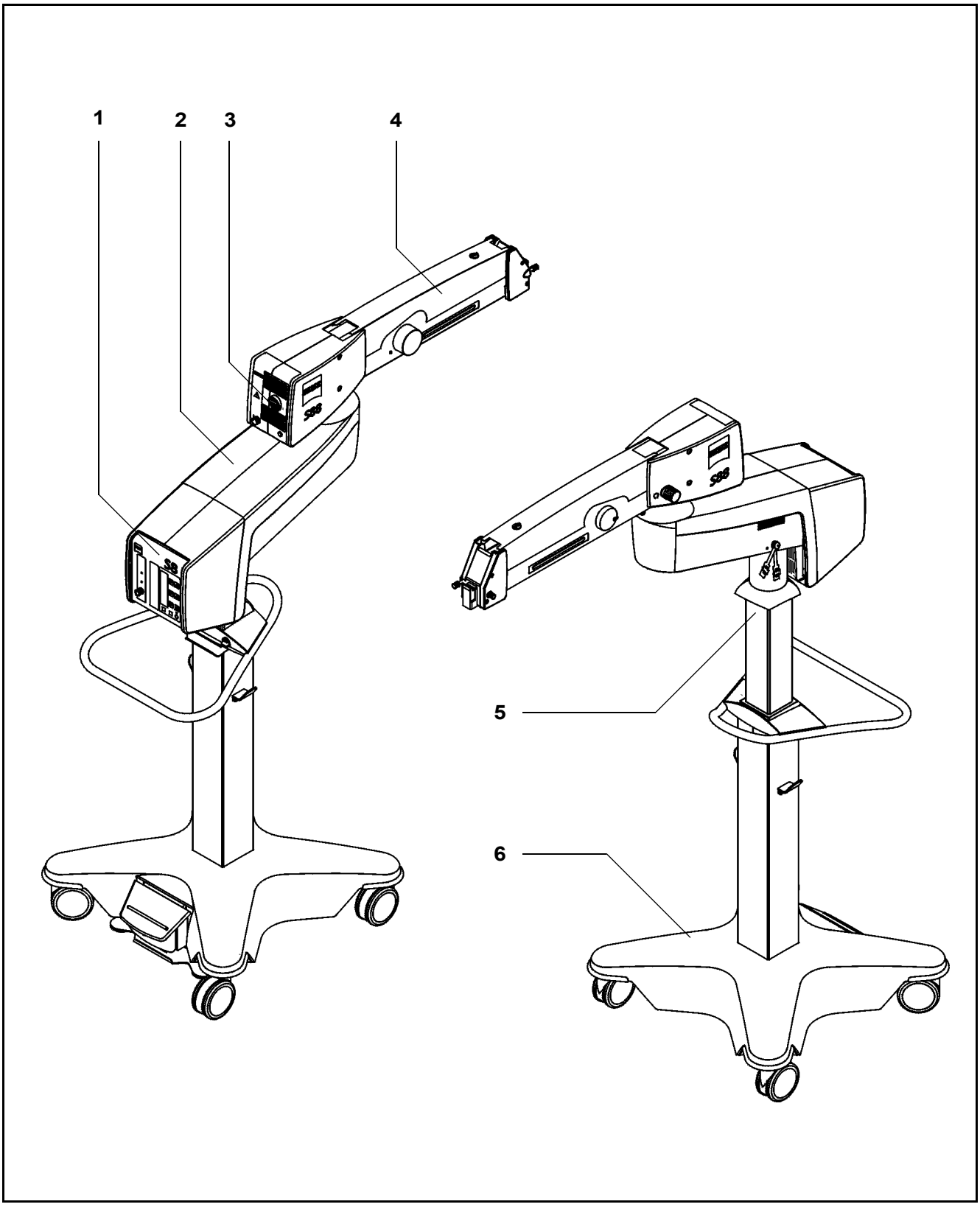
2 Carrier arm

3 Lamp housing with Xenon illumination

4 Suspension arm

5 Motorized stand lifting column

6 Stand base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Stand base with lifting column

1 Lifting column

2 Handle
for moving the stand.

3 Support
for hanging up the foot control panel during transport.

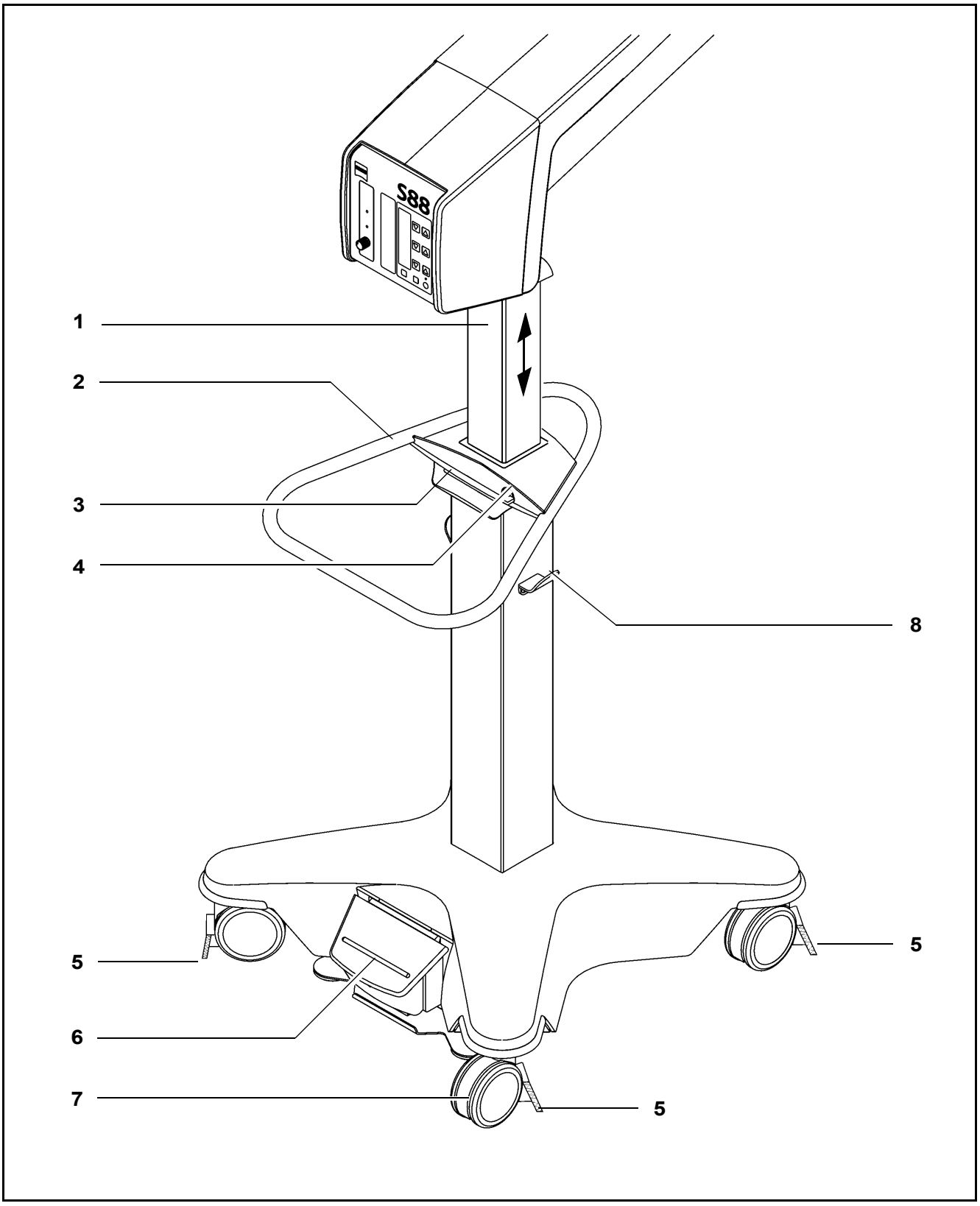
4 Up/down switch
for setting the optimum viewing height of the surgical microscope, for moving the system up into the standby position or down into the transport position.
As long as you keep switch (4) pressed, lifting column (1) in the stand base moves upward or downward, depending on the switch position. When you release the up/down switch, the lifting column stops immediately.
The switching technology causes a dead time of approx. 2 seconds at the upper and lower end positions of the lifting column. After this time, you can move in the opposite direction again by activating switch (2).

5 Cable deflectors
are provided to prevent cables on the floor from being run over and damaged.

6 Locking pedal
Press once to lock the stand in position.
Press a second time to release the locking pedal.

7 Steerable casters
The four steerable casters on the stand base permit easy positioning in the OR.

8 Cable support (2x)
for winding up the power cord and the cable of the foot control panel.


S88
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Connector panel

1 Remote control socket
for triggering an AUX signal, e.g. to switch on/off an external device operating at max. 24V/0.5A.

2 Connector for switching component
Connection possibility for: a foot control panel, a hand control panel or an operating chair with an appropriate foot switch.

3 Potential equalization bolt

4 Indicator window for rated voltage
The voltage shown here must correspond to the rated line voltage provided on the site of installation. You can adjust the sliding switch using a suitable tool.

Warning!
Please observe the maximum current consumption of two power outlets (4) and (5). Only connect medical devices approved by us to outlets (4) and (5). When using other instruments, make sure that safety is guaranteed regarding admissible ground leakage currents. The admissible limit value of the ground leakage current present in the suspension system's power cord must not exceed 500 µA in compliance with EN60601-1/IEC 60601-1. CSA/US certification in compliance with UL 60601-1 only allows a maximum ground leakage current of 300 µA.

5 Power outlet socket
for medical devices with a maximum current consumption of 2 A.

Note:
The current of this power outlet is switched on/off using power switch S2 (7).

6 Power outlet socket
for medical devices with a maximum current consumption of 5 A.

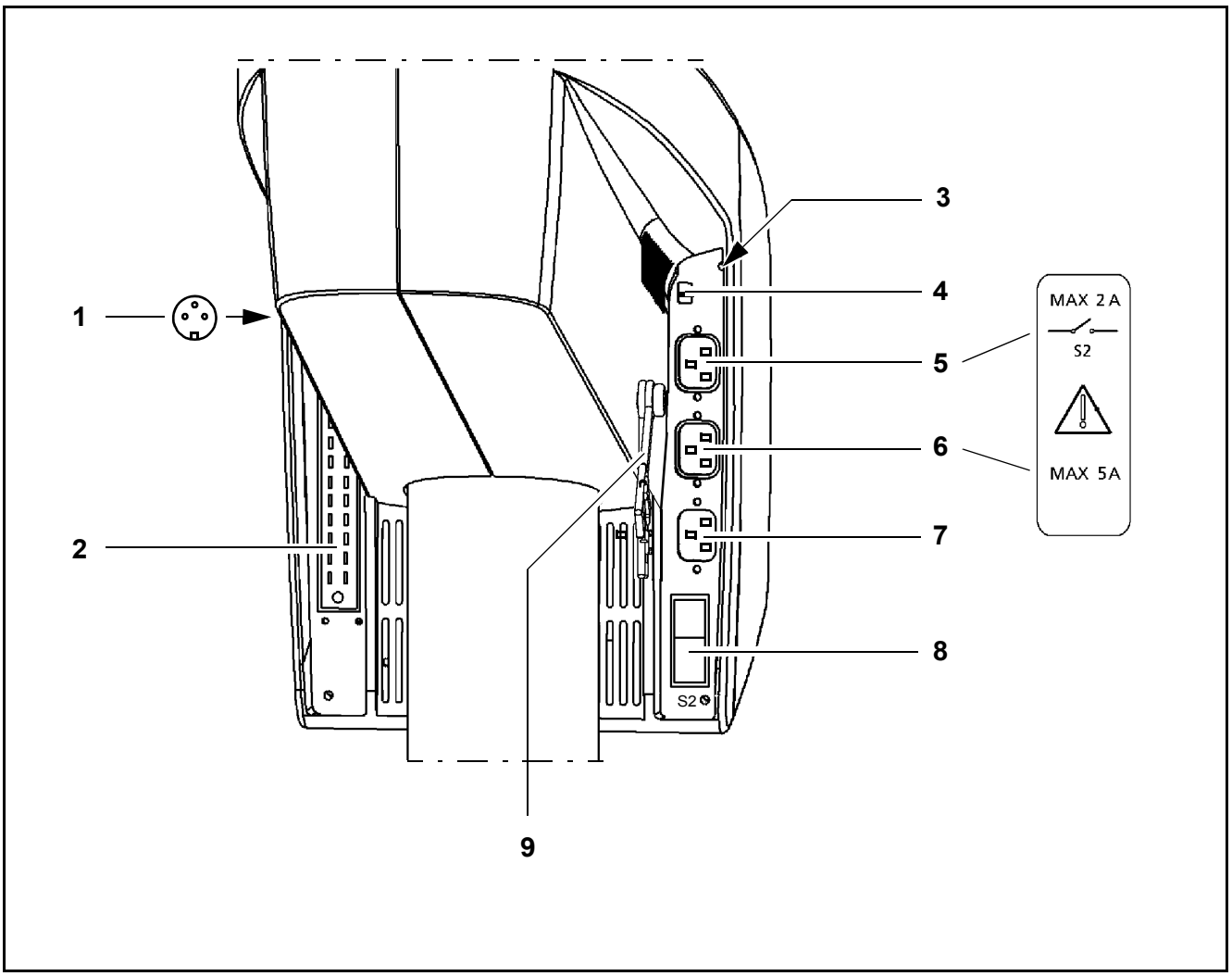
7 Power inlet socket

8 Power switch S2
When the stand is on, the green indicator light in the switch is lit.

9 Strain relief device
The strain relief device prevents inadvertent unplugging of the following electrical connections:

– power cable,

– connecting cable for foot control panel, hand control panel or operating chair with appropriate footswitch.



S8 ceiling mount

Intended use

The S8 ceiling mount is a carrier system for the surgical microscope. It is used to power and control the motorized functions of the surgical microscope. The hallmarks of the S8 ceiling mount are its superb mobility and easy operation. The motorized functions can be activated using a foot control panel.

Further useful functions include, for example:

– magnetic brakes for almost effortless positioning,

– brightness control via a foot control panel,

– reset of X-Y coupling, focus and zoom,

– user-defined basic settings for a maximum of nine users:

  – speeds for focus, zoom and X-Y coupling

  – and configurable buttons on the foot control panel for focus memory, XY inversion, camera release, swinging SDI in/out, triggering an AUX signal.

Warning!
The ceiling mount with xenon illumination must not be used for ophthalmic procedures.

Description of the modules

The S8 ceiling mount comprises an articulated arm, a suspension arm with the illumination system and a control unit.

The articulated arm consists of a lift arm and a carrier arm. The lifting function permits the ceiling mount to be moved to a standby position. A grip is provided for height adjustment of the ceiling mount.
The suspension arm with the illumination system and the control unit is mounted on the carrier arm. The control unit is rotatable through 180° and contains all electrical supply systems required for the control of a motorized surgical microscope. The motorized functions can be activated using a foot control panel.

The suspension arm permits almost effortless positioning of the surgical microscope. The spring force of the suspension arm can be varied in a range from 8 to 20 kg, permitting reliable balancing of the microscope even with heavy accessory equipment. The downward movement of the suspension arm can be limited as required.

Design

1 Lift arm

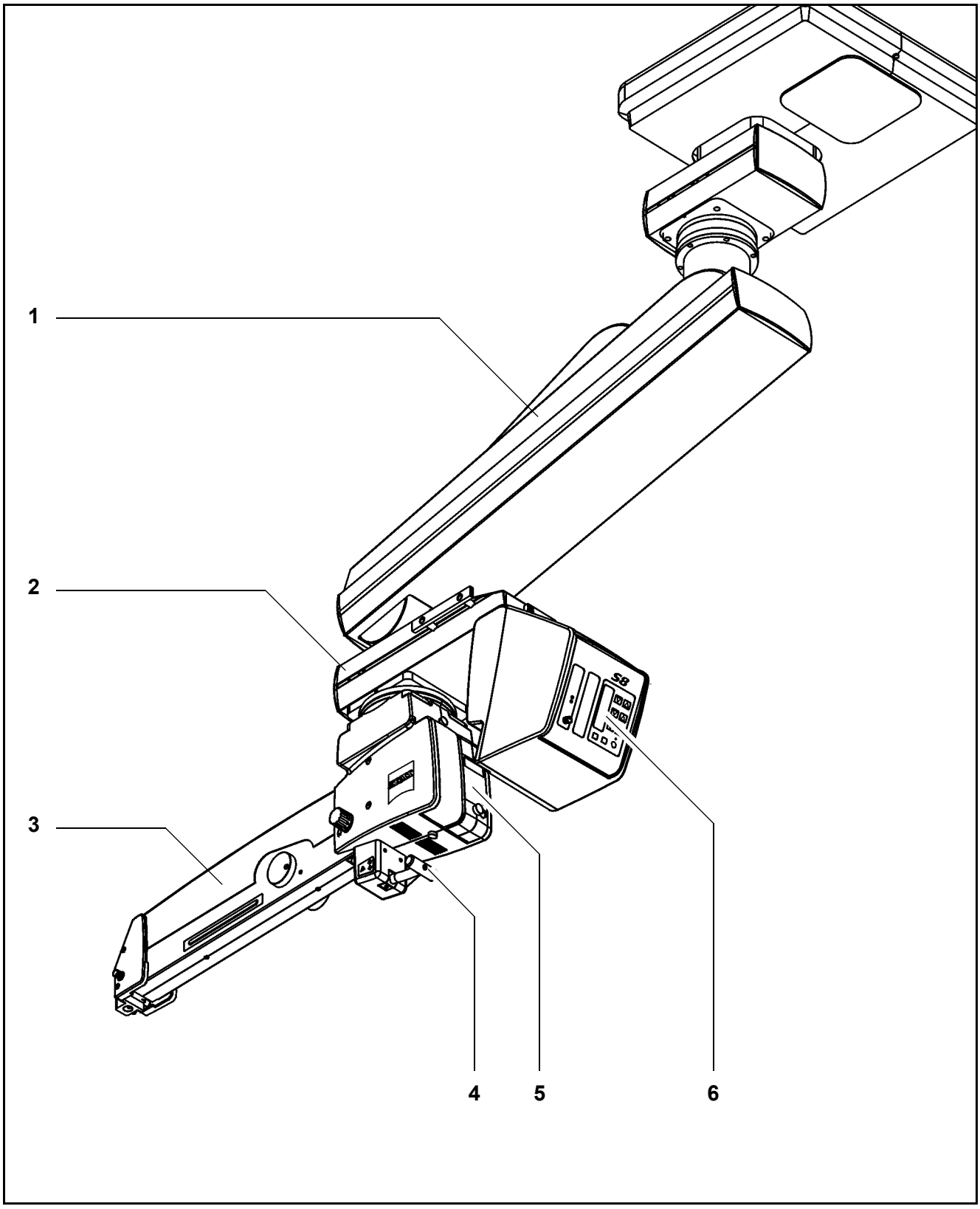
2 Carrier arm

3 Suspension arm

4 Grip
for moving the ceiling mount into the standby or working position.

5 Xenon illumination system, see page 66

6 Control panel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S8

Power switch with connector (option)

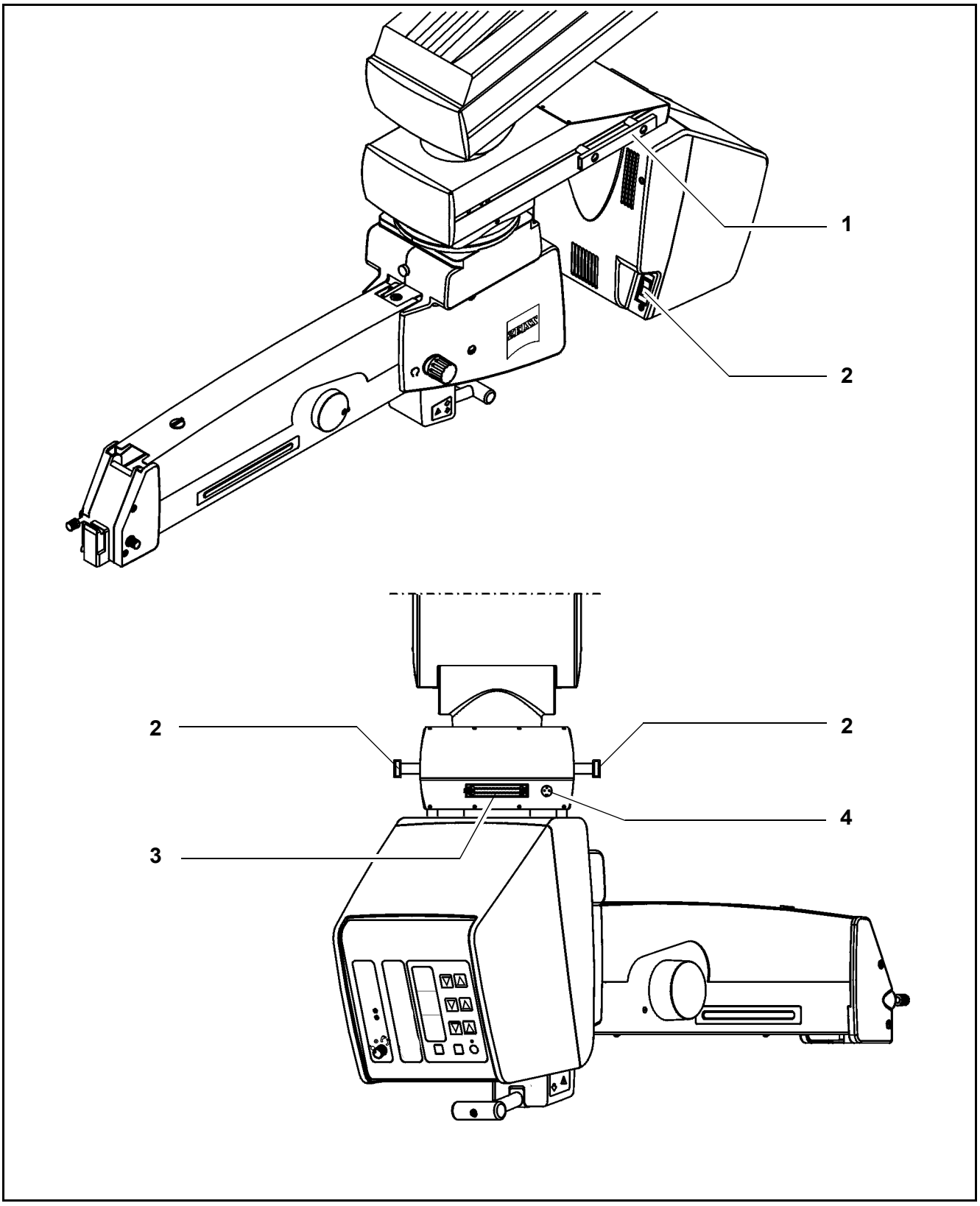
The power switch and the connector can be either installed in the OR, or they can be integrated in the ceiling mount, at the back of the carrier arm (see illustration).

1 Rail
The delivery package contains a cable clip which is used to guide the cable of the foot control panel away from the operating table. The cable clip can be easily attached to rail (1) either on the left or right side of the arm.

2 Power switch
When the suspension system is on, the green indicator light in the switch is lit.

3 Connector for control component (option)
Permits optional connection of a foot control panel. (In the standard version, the connector is integrated in the wall console).

4 Remote socket
for triggering an AUX signal, e.g. to switch on/off an external device operating at max. 24V/0.5A.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S81 ceiling mount

Intended use

The S81 ceiling mount is a carrier system for the surgical microscope. It is used to power and control the motorized functions of the surgical microscope. The hallmarks of the S81 ceiling mount are its superb mobility and easy operation. The motorized functions can be activated using a foot control panel.

Further useful functions include, for example:

– magnetic brakes for almost effortless positioning,

– brightness control via a foot control panel,

– reset of X-Y coupling, focus and zoom,

– user-defined basic settings for a maximum of nine users:

  – speeds for focus, zoom and X-Y coupling

  – and configurable buttons on the foot control panel for focus memory, XY inversion, camera release, swinging SDI in/out, triggering an AUX signal.

Warning!
The ceiling mount with xenon illumination must not be used for ophthalmic procedures.

Description of the modules

The S81 ceiling mount comprises a column, a carrier arm and a suspension arm.

The suspension arm with the illumination system and the control unit is mounted on the carrier arm. The control unit is rotatable through 180° and contains all electrical supply systems required for the control of a motorized surgical microscope. The motorized functions can be activated using a foot control panel.

The suspension arm permits almost effortless positioning of the surgical microscope. The spring force of the suspension arm can be varied in a range from 8 to 20 kg, permitting reliable balancing of the microscope even with heavy accessory equipment. The downward movement of the suspension arm can be limited as required.

Design

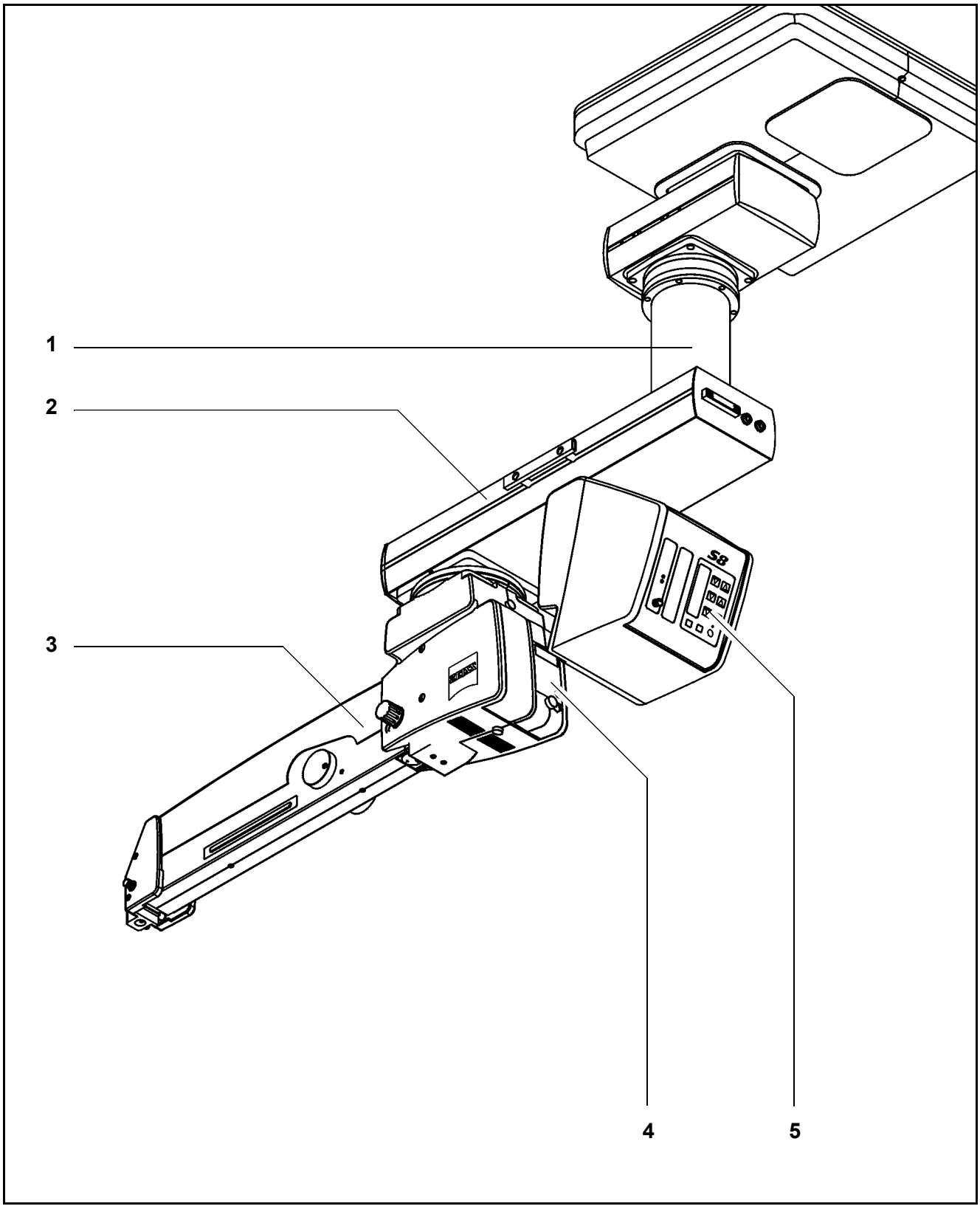
1 Column

2 Carrier arm

3 Suspension arm

4 Xenon illumination system, see page 66

5 Control panel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S8

Power switch, connector and socket (option)

The connector and socket can be either installed in the OR, or they can be integrated in the ceiling mount, at the back of the carrier arm (see illustration).

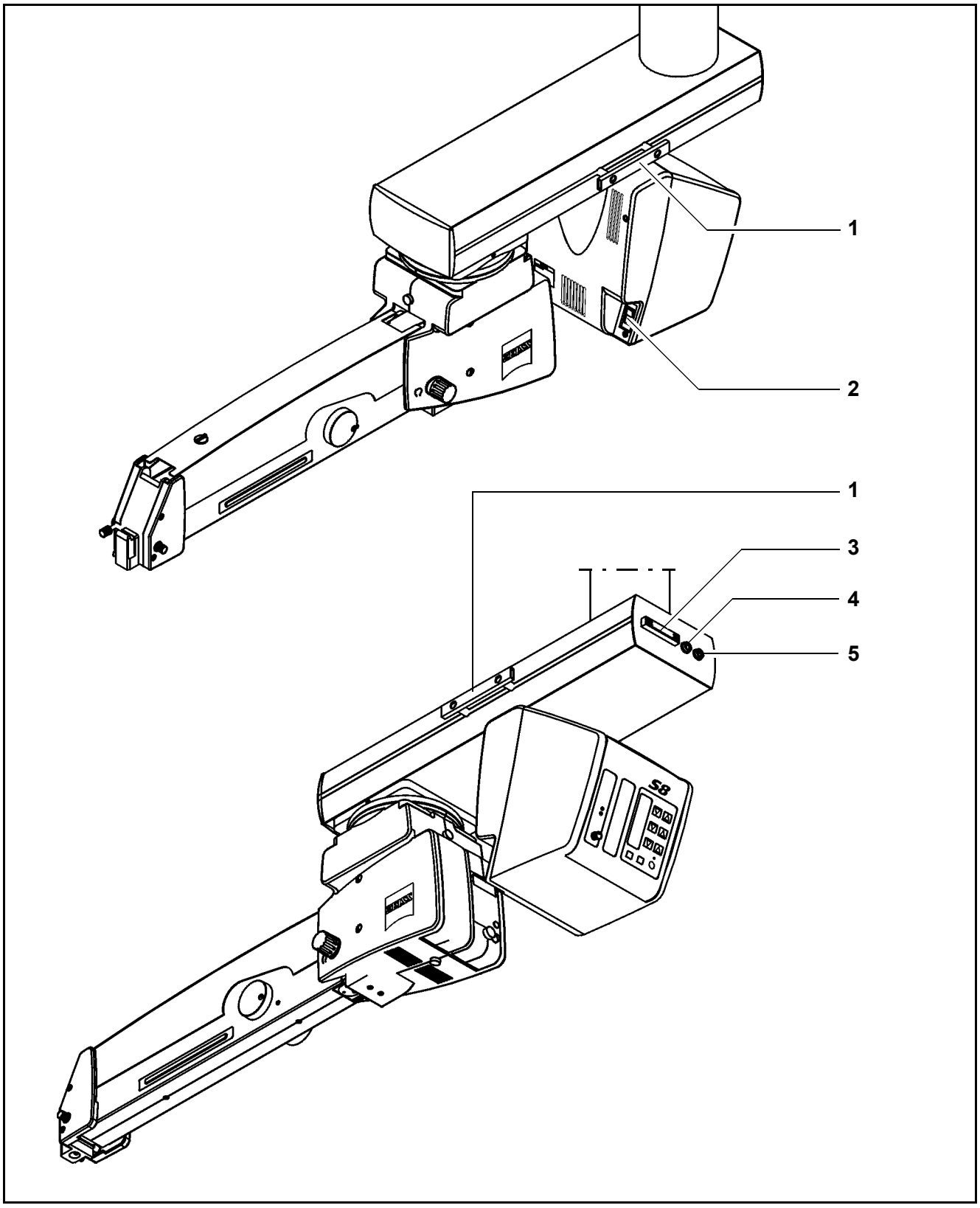
1 Rail
The delivery package contains a cable clip which is used to guide the cable of the foot control panel away from the operating table. The cable clip can be easily attached to rail (1) either on the left or right side of the arm.

2 Power switch
When the suspension system is on, the green indicator light in the switch is lit.

3 Connector for control component (option)
Here, a foot control panel can be connected.

4 Socket for control component (option)
If the ceiling mount is installed on a ceiling track mount, you can use a foot control panel to move the ceiling mount to its working position or standby position.

5 Remote socket
for triggering an AUX signal, e.g. to switch on/off an external device operating at max. 24V/0.5A.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S8

VARIO surgical microscope on S88 floor stand

Intended use

The OPMI® VARIO surgical microscope has been designed for reconstructive and plastic surgery, for neurosurgery and multidisciplinary use, i.e. the device meets the special requirements made on a surgical microscope in these disciplines.

The S88 floor stand powers and controls the motorized functions of the OPMI® VARIO surgical microscope. The hallmarks of the S7 ceiling mount are its superb mobility and easy operation. Four steerable casters on the stand base permit easy positioning in the OR. The motorized functions of the surgical microscope can be activated using a foot control panel.

The system has been designed for use in hospitals, clinics or other human medicine institutions.

The system must only be operated by physicians, nurses and other OR staff who have undergone appropriate training and observe the instructions of the user's manual. The installation conditions and the use of the system must meet microsurgical requirements:

– low vibration

– clean environment

– avoidance of extreme mechanical stress.

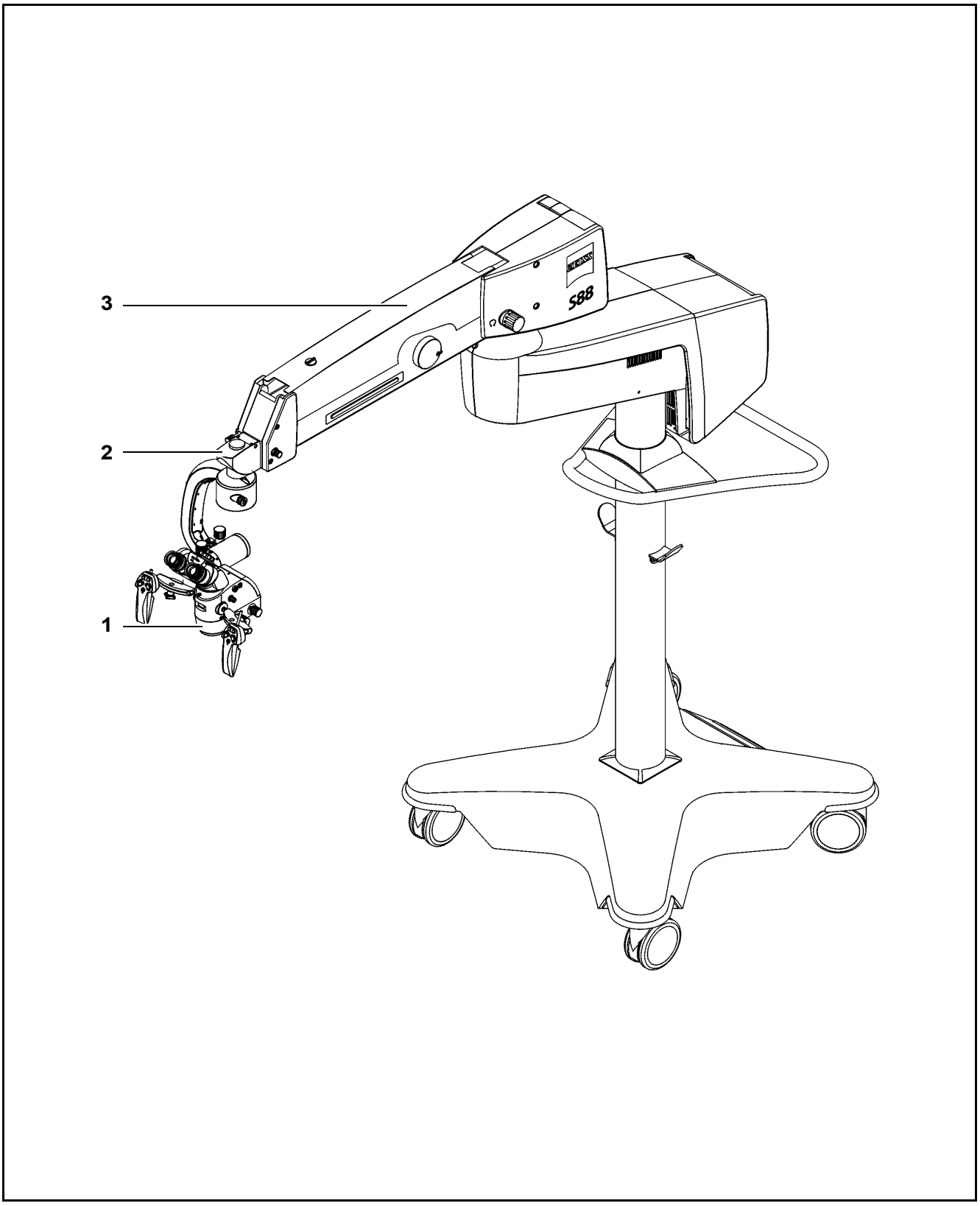
For more information, get in touch with our authorized representatives.

Design

1 VARIO surgical microscope

2 Coupling

3 S88 floor stand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S88

VARIO surgical microscope on S88 floor stand with lifting column

Intended use

The OPMI® VARIO surgical microscope has been designed for reconstructive and plastic surgery, for neurosurgery and multidisciplinary use, i.e. the device meets the special requirements made on a surgical microscope in these disciplines.

The S88 floor stand with lifting column powers and controls the motorized functions of the OPMI® VARIO surgical microscope. The hallmarks of the S88 floor stand are its superb mobility and, in particular, its easy operation and the possibility of vertical adjustment. Four steerable casters on the stand base permit easy positioning in the OR. The motorized functions of the surgical microscope can be activated using a foot control panel.

The system has been designed for use in hospitals, clinics or other human medicine institutions.

The system must only be operated by physicians, nurses and other OR staff who have undergone appropriate training and observe the instructions of the user's manual. The installation conditions and the use of the system must meet microsurgical requirements:

– low vibration

– clean environment

– avoidance of extreme mechanical stress.

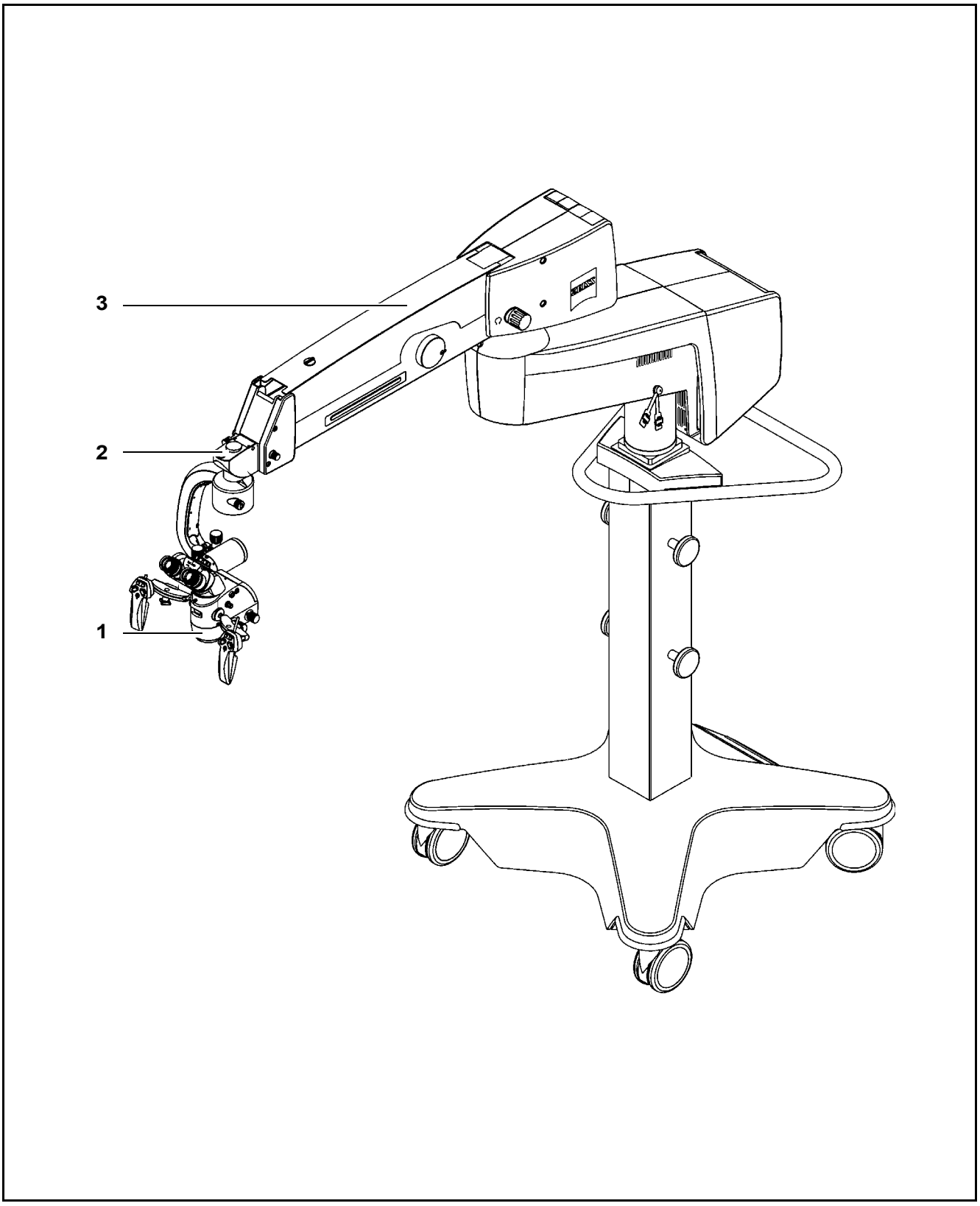
For more information, get in touch with our authorized representatives.

Design

1 VARIO surgical microscope

2 Coupling

3 S88 floor stand with lifting column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VARIO surgical microscope on S8 ceiling mount

Intended use

The OPMI® VARIO surgical microscope has been designed for reconstructive and plastic surgery, for neurosurgery and multidisciplinary use, i.e. the device meets the special requirements made on a surgical microscope in these disciplines.

The S8 ceiling mount powers and controls the motorized functions of the OPMI® VARIO surgical microscope. The hallmarks of the S7 ceiling mount are its superb mobility and easy operation. The motorized functions of the surgical microscope can be activated using a foot control panel.

The system has been designed for use in hospitals, clinics or other human medicine institutions.

The system must only be operated by physicians, nurses and other OR staff who have undergone appropriate training and observe the instructions of the user's manual. The installation conditions and the use of the system must meet microsurgical requirements:

– low vibration

– clean environment

– avoidance of extreme mechanical stress.

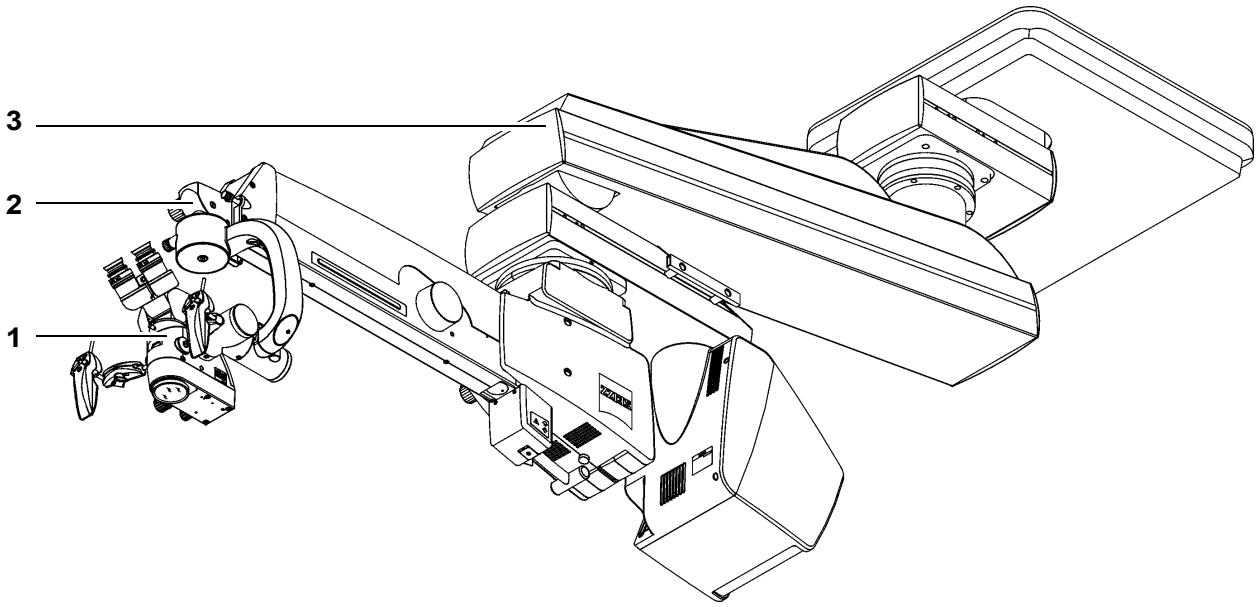
For more information, get in touch with our authorized representatives.

Design

1 VARIO surgical microscope

2 Coupling

3 S8 ceiling mount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VARIO surgical microscope on S81 ceiling mount

Intended use

The OPMI® VARIO surgical microscope has been designed for reconstructive and plastic surgery, for neurosurgery and multidisciplinary use, i.e. the device meets the special requirements made on a surgical microscope in these disciplines.

The S81 ceiling mount powers and controls the motorized functions of the OPMI® VARIO surgical microscope. The hallmarks of the S7 ceiling mount are its superb mobility and easy operation. The motorized functions of the surgical microscope can be activated using a foot control panel.

The system has been designed for use in hospitals, clinics or other human medicine institutions.

The system must only be operated by physicians, nurses and other OR staff who have undergone appropriate training and observe the instructions of the user's manual. The installation conditions and the use of the system must meet microsurgical requirements:

– low vibration

– clean environment

– avoidance of extreme mechanical stress.

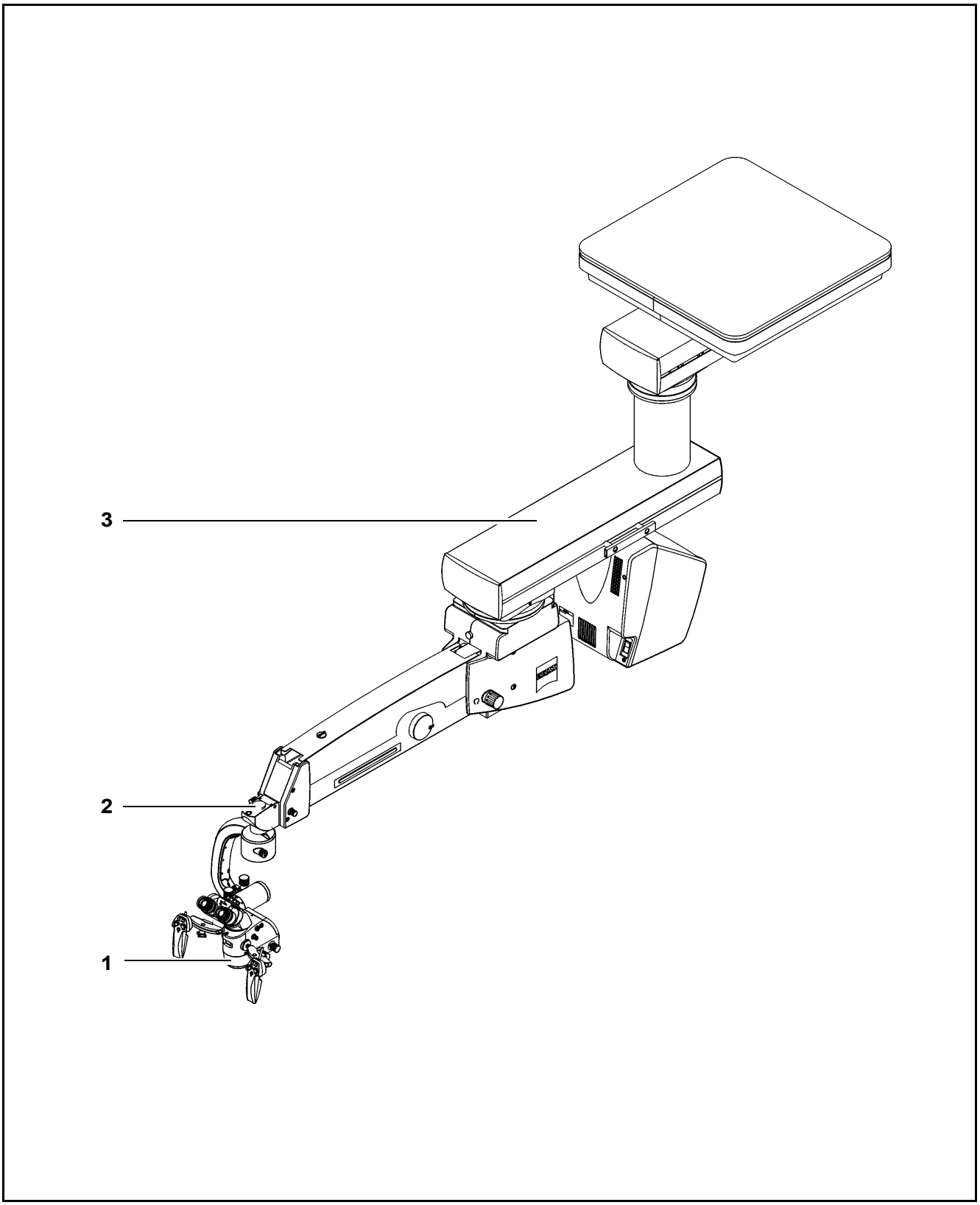
For more information, get in touch with our authorized representatives.

Design

1 VARIO surgical microscope

2 Coupling

3 S81 ceiling mount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Foot control panel (option)

Intended use

The foot control panel permits you to operate various functions of a suspension system or surgical microscope. The assignment of functions to the controls on the foot control panel is described on the next page. Only functions provided in the system configuration used (suspension system, surgical microscope) can be controlled.

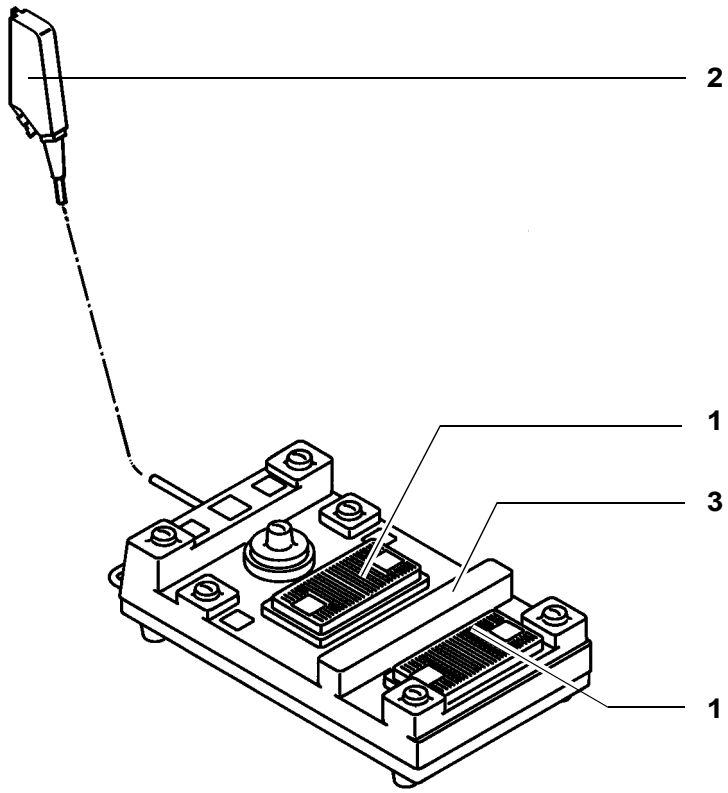
Design

The 8-function and 14-function foot control panels feature two rocker switches (1) which are used to control the ”Zoom” and ”Focus” functions. The switches for these functions are located on one side, allowing you to control both directions of a function using toe/heel movement without having to shift your foot. Bridge (3) between two rocker switches (1) serves as a support to rest your foot on.

Connector (2) is used to connect the foot control panel to the appropriate connector on a suspension system or a wall-mounted control panel.

The foot control panel is provided with a waterproof rubber cover.

The illustration shows the 14-function foot control panel. Depending on the configuration involved, an 8-function foot control panel can also be connected.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Foot control panel with 14 functions

The illustration shows the standard assignment of functions to the foot control panel with 14 functions. The focus/zoom assignment can be changed by our service staff, on request.

1 Control of an X-Y coupling (if installed)

2 Button A: Reducing the lamp brightness

3 Button C: Function as assigned in configuration mode 1

4 ZOOM ▼: Reducing magnification, increasing the field of view (alternatively FOCUS ▲: Increasing the working distance)

5 ZOOM ▲: Increasing magnification, reducing the field of view

6 Illumination on/off

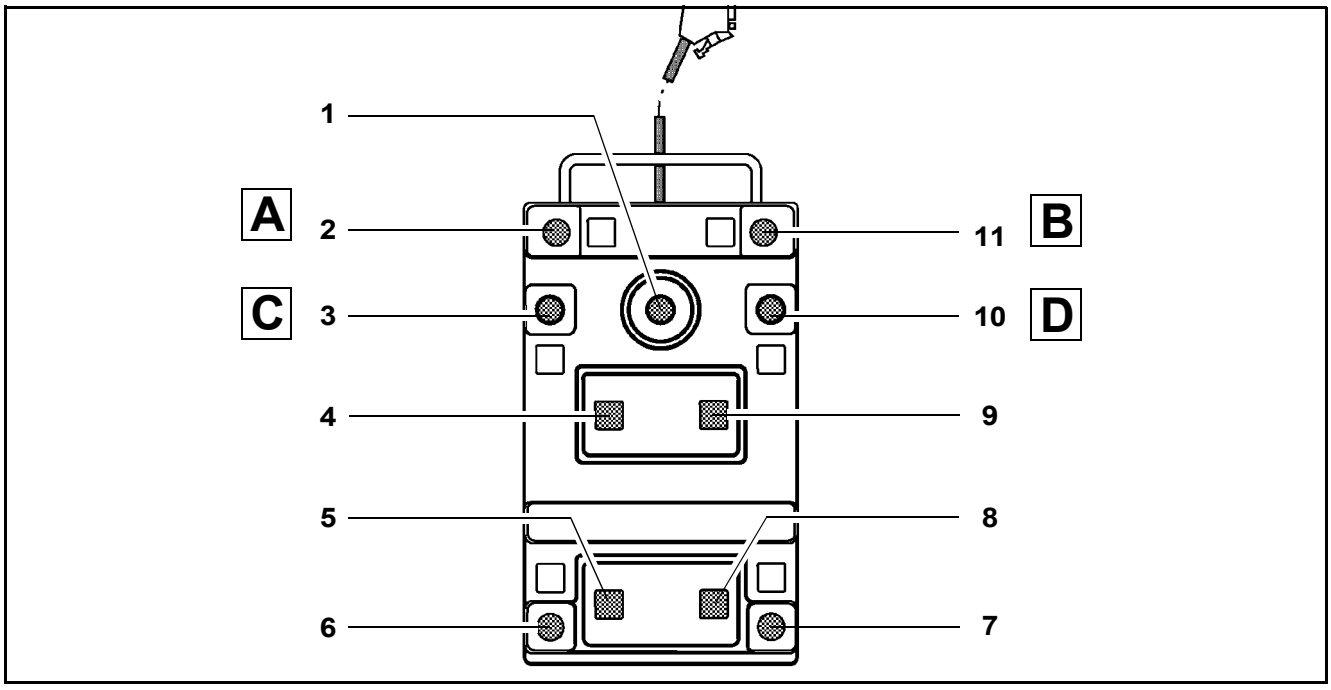
7 Illumination on/off

8 FOCUS ▲: Increasing the working distance (alternatively ZOOM ▼: Reducing magnification, increasing the field of view)

9 FOCUS ▼: Reducing the working distance

10 Button D: Function as assigned in configuration mode 1

11 Button B: Increasing the lamp brightness



Foot control panel with 8 functions

The illustration shows the standard assignment of functions to the foot control panel with 8 functions.
The focus/zoom assignment can be changed by our service staff, on request.

1 Reducing the lamp brightness

2 No function

3 ZOOM ▼: Reducing magnification, increasing the field of view (alternatively FOCUS ▲: Increasing the working distance)

4 ZOOM ▲: Increasing magnification, reducing the field of view

5 Button C: Function as assigned in configuration mode 1

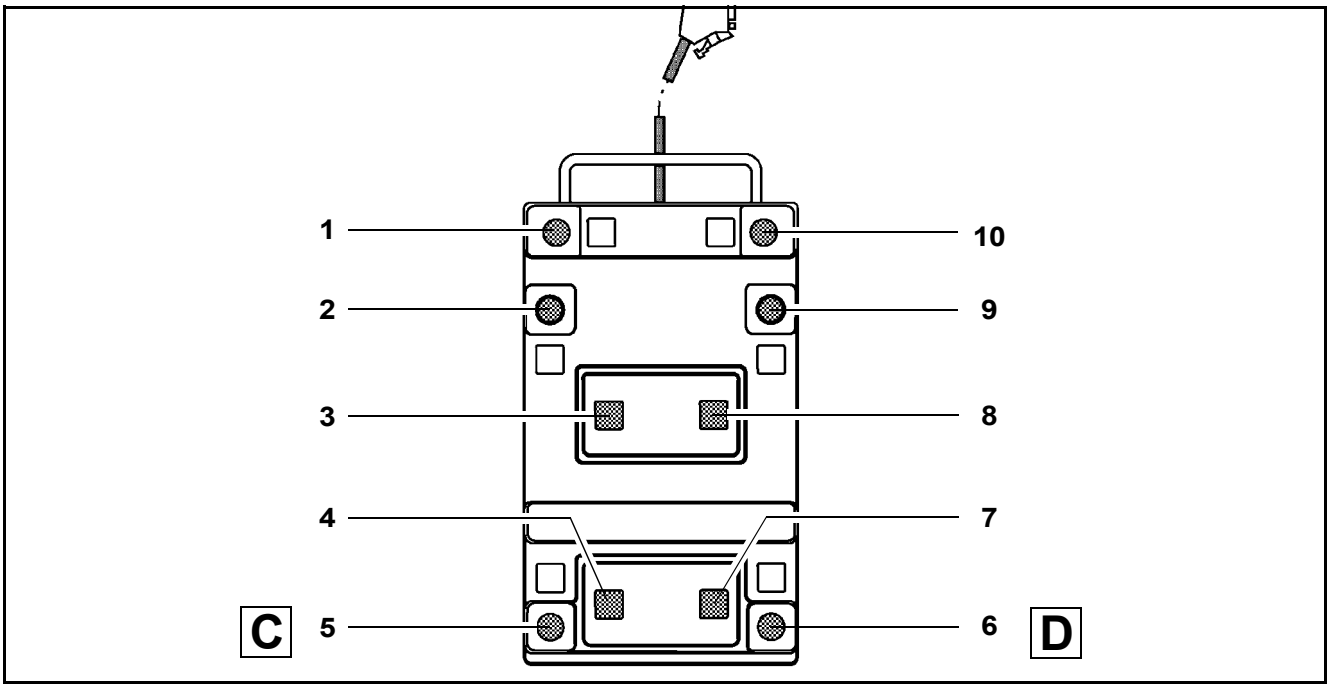
6 Button D: Function as assigned in configuration mode 1

7 FOCUS ▲: Increasing the working distance (alternatively ZOOM ▼: Reducing magnification, increasing the field of view)

8 FOCUS ▼: Reducing the working distance

9 No function

10 Increasing the lamp brightness



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Attaching the equipment

Mounting the surgical microscope

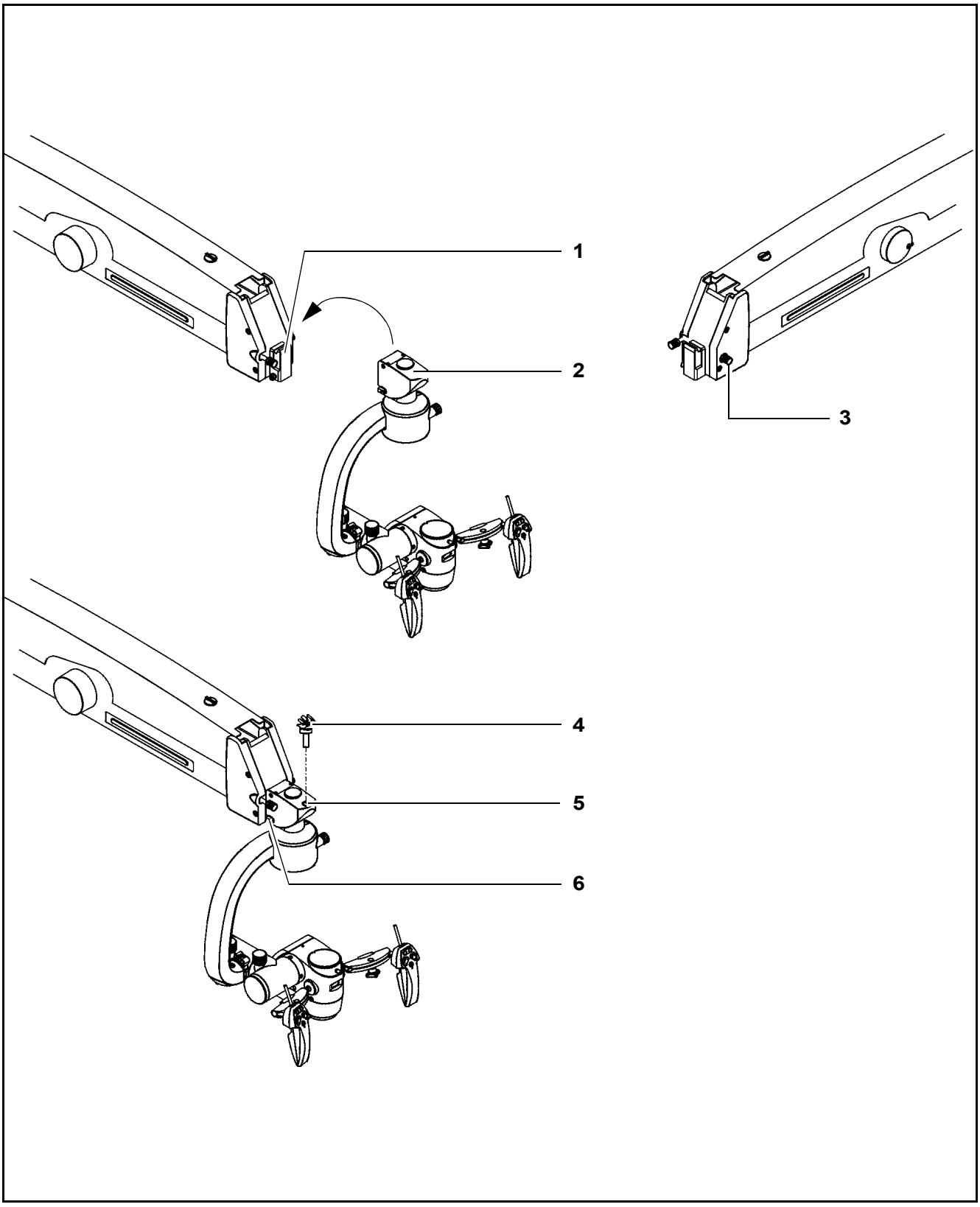
Warning!

The maximum weight of the microscope including accessories must not exceed 20 kg!

- Bring the suspension arm into its horizontal position, pull out locking knob (3) and turn it clockwise or counterclockwise through 180°. At the same time, slightly move the suspension arm up and down until the lock snaps in. This prevents the suspension arm from uncontrollably moving upward when insufficient weight is attached.
- Turn off the system at the power switch.
- Hook coupling (2) with the attached surgical microscope at a slight angle from above into receptacle (1) on the suspension arm, and tilt the coupling downward into its vertical position.
- Tighten securing screw (6) firmly using a hex key.
- Insert cable clip (4) into opening (5) of the coupling.
- Perform the balance setting procedure.

Warning!

Before every use and after re-equipping the system, make sure that securing screw (6) has been firmly tightened!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Attaching accessories

The comprehensive accessory program permits the OPMI Vario surgical microscope to be configured to your specific needs.

Make sure not to exceed the maximum admissible load in order to ensure optimum mobility and reliable operation of your OPMI Vario. The weight of the complete accessory configuration must not be higher than 9.0 kg. For example, the combined accessory modules of configuration (1) without the video objective lens and video camera have a weight of 3.9 kg.

Caution:

- Select your configurations so that the weight distribution is as symmetrical as possible.
- Please observe the maximum permissible load on the suspension system.
- The extensive removal of accessory modules may lead to unintended tilting of the microscope body. Rebalance the surgical microscope in this case.
- For mounting the accessory modules, proceed as described in the following section "Mounting the tube and eyepieces" () for the binocular tube.
- Attach the accessory modules to the microscope and firmly tighten the respective securing screw.

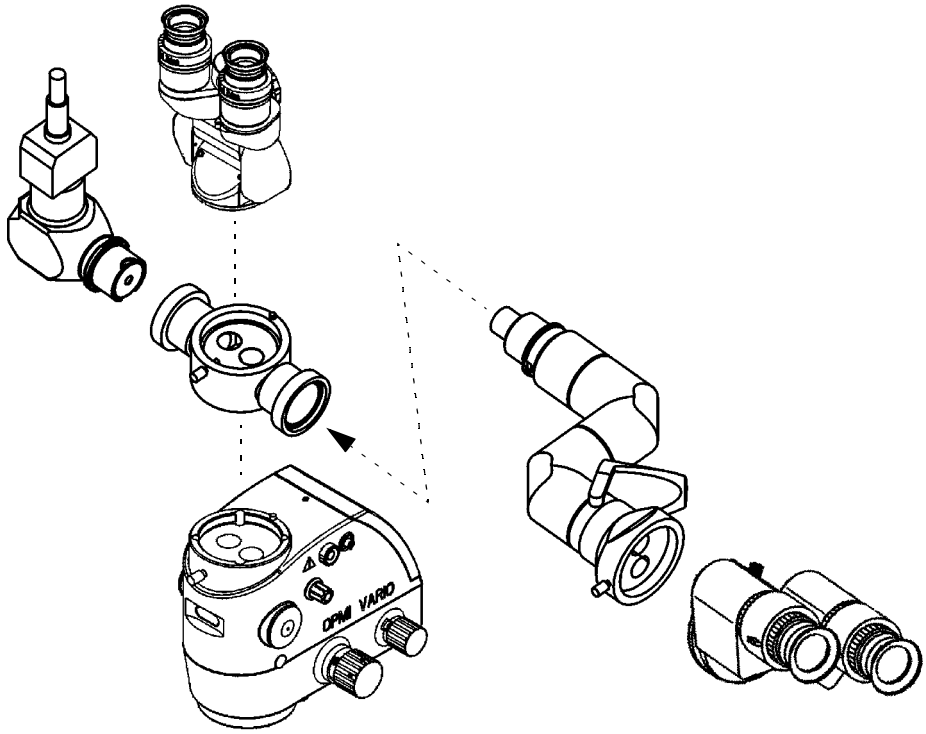
Warning!

- Before every use and after re-equipping the instrument, make sure that the modules are securely locked in position.
- Make sure that all securing screws are firmly tightened!
- **Accurately re-balance the surgical microscope after every reconfiguration of the system.**

1 Recommended configuration for lateral coobservation, left or right
Accessory modules: beam splitter, 180° tiltable tube, stereo coobservation tube with straight tube, video objective lens with video camera.

2 Recommended configuration for face-to-face coobservation
Accessory modules: stereobridge, 2 x rotary adapter and 180° tiltable tube, video objective lens with video camera.

1



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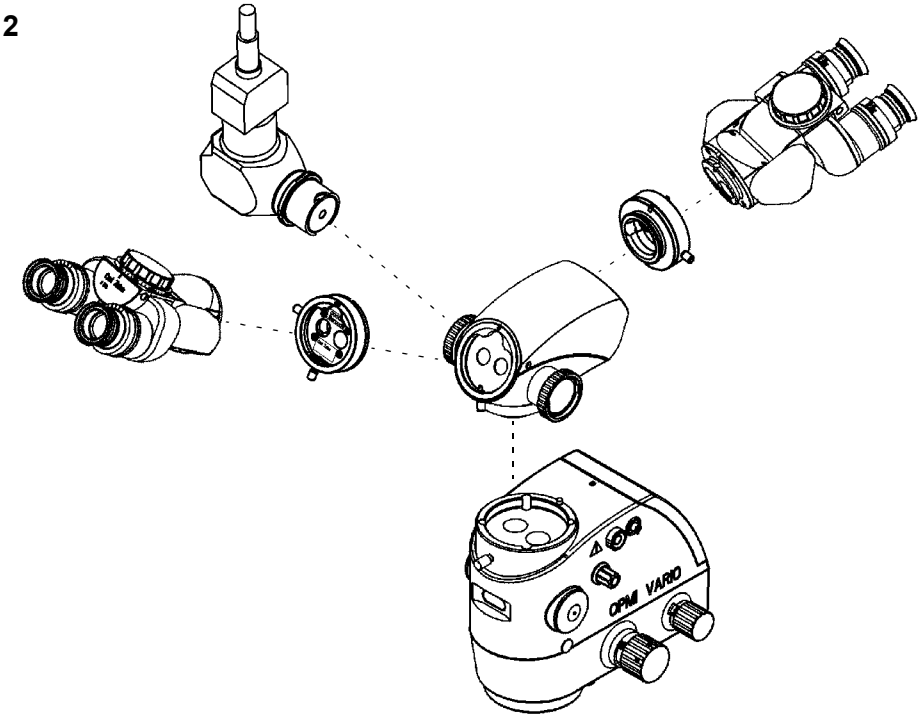
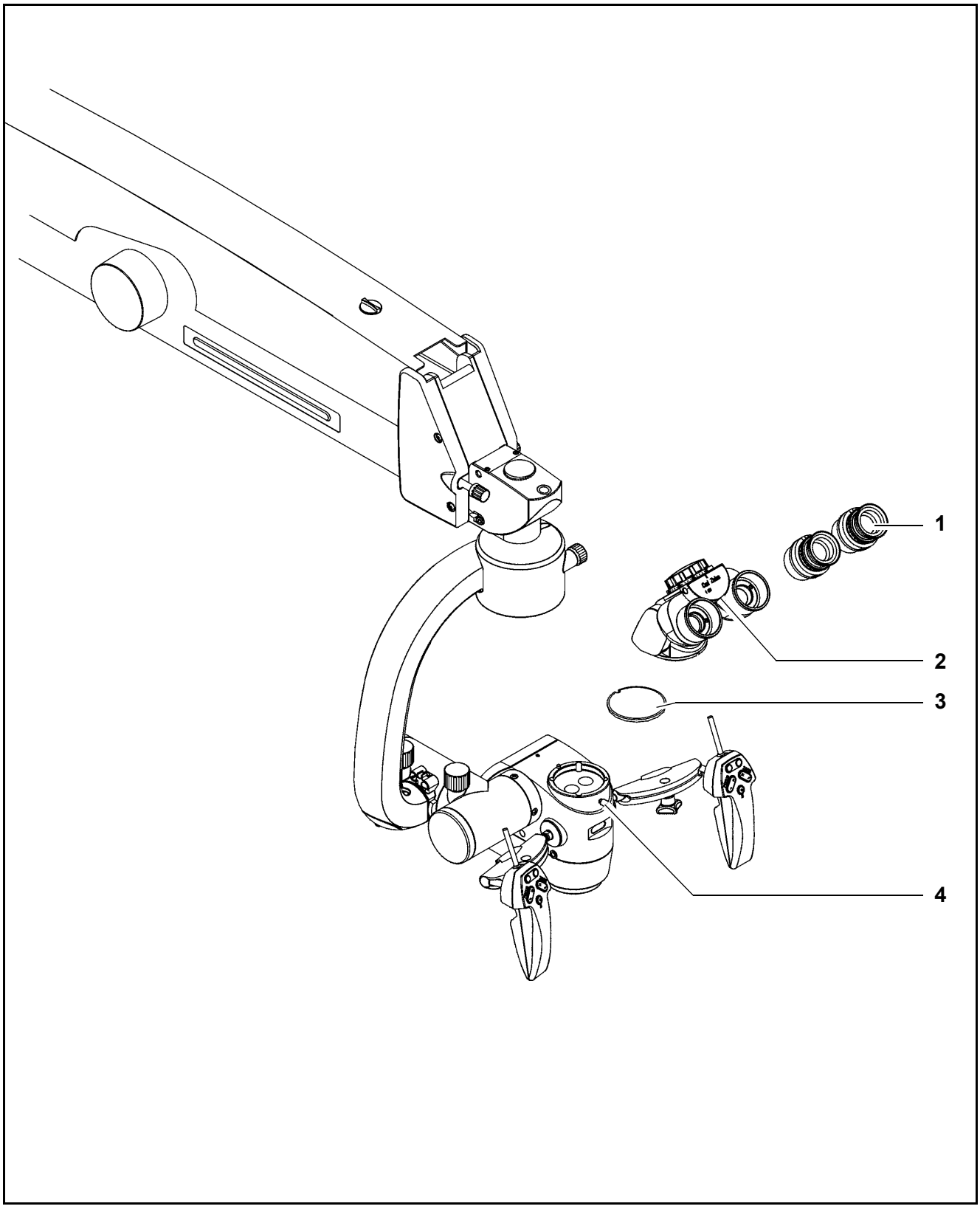


Mounting the tube and eyepieces

- Loosen securing screw (4) by a few turns.
- Remove cover (3) and store it in a safe place.
- Place binocular tube (2) on the surgical microscope and tighten securing screw (4) firmly .
- You can install accessory equipment between the binocular tube and the microscope body. Lock these units in position in the same way using securing screw (4).
- Insert widefield eyepieces (1) into the appropriate mounts as far as they will go. The magnetic coupling reliably secures them in position.

Note:
If a documentation device is used, one of the eyepieces can be delivered with a reticle to aid focusing. Retrofitting the reticle is only possible at the factory or by our service representative. Always use the eyepiece with the reticle on the same side of the binocular tube as the documentation device is installed.

Warning!
Before using and after re-equipping the unit, make sure that binocular tube (2) is securely locked in position. Make sure that securing screw (4) is firmly tightened!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Connections

Connecting the surgical microscope

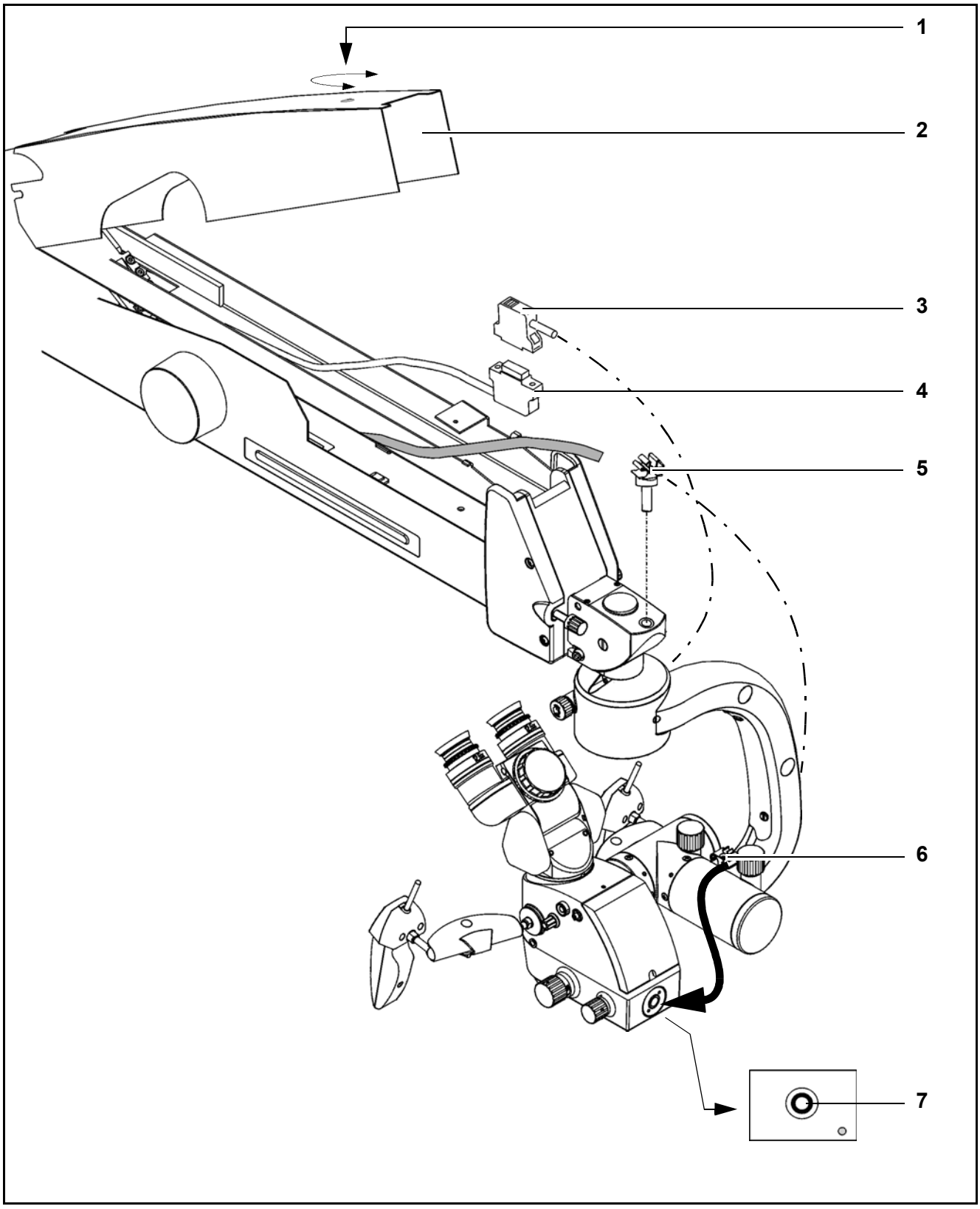
- Turn locking cap (1) by a quarter turn to the right or left and pull up cover (2).
- Plug microscope connector (3) into connector (4) and tighten the securing screws on the microscope connector.
- Press the microscope cable into cable clip (5). Install the cable in such a way that it is neither stretched nor kinked when the microscope is turned or tilted.
- Press down cover (2) as far as it will go and lock it with cap (1).

Note:
The illustration on the right shows the surgical microscope in a rotated position.

Mounting the light guide

- Switch off the illumination system.
- Insert the end of the light guide into light guide socket (7) of the microscope as far as it will go, and press the light guide into cable clip (6).
- Make sure that the light guide has been routed with sufficient slack so that the movement of the carrier system and surgical microscope is not restricted and that they can be moved in all directions without stretching, extreme kinking or twisting of the light guide.

Note:
Make sure that the light guide is not stretched or bent when the microscope is turned or tilted.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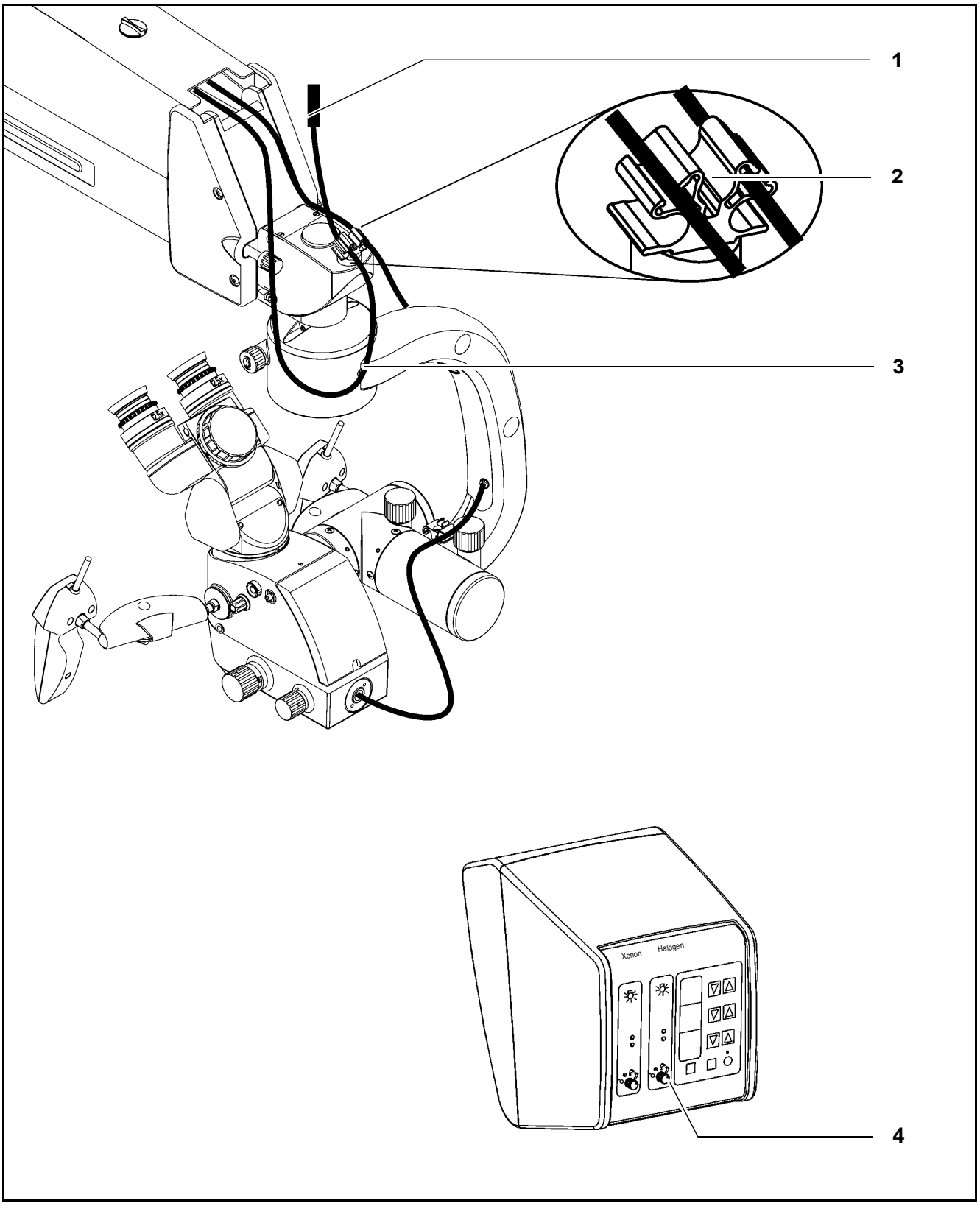
Warning!
It may happen that no second lamp module such as the VISULUX™ fiber slit lamp is used on the microscope.

To prevent light guide (3) provided for this purpose from injuring the patient, you must attach it to the cable holder of the suspension system.

- Switch off the illumination system for the unneeded light guide by setting the illumination selector switch (4) to the left.
- Press the light guide into an empty position of cable holder (2).
- Remove cap (1) from the light guide. This prevents melting of the cap in case the second illuminator is switched on by mistake.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Xenon
Halogen
4

Aligning the X-Y coupling

Note:

- The OPMI® VARIO can be equipped (and also retrofitted) with an X-Y coupling. Our service team or an authorized person will install the X-Y coupling for you.

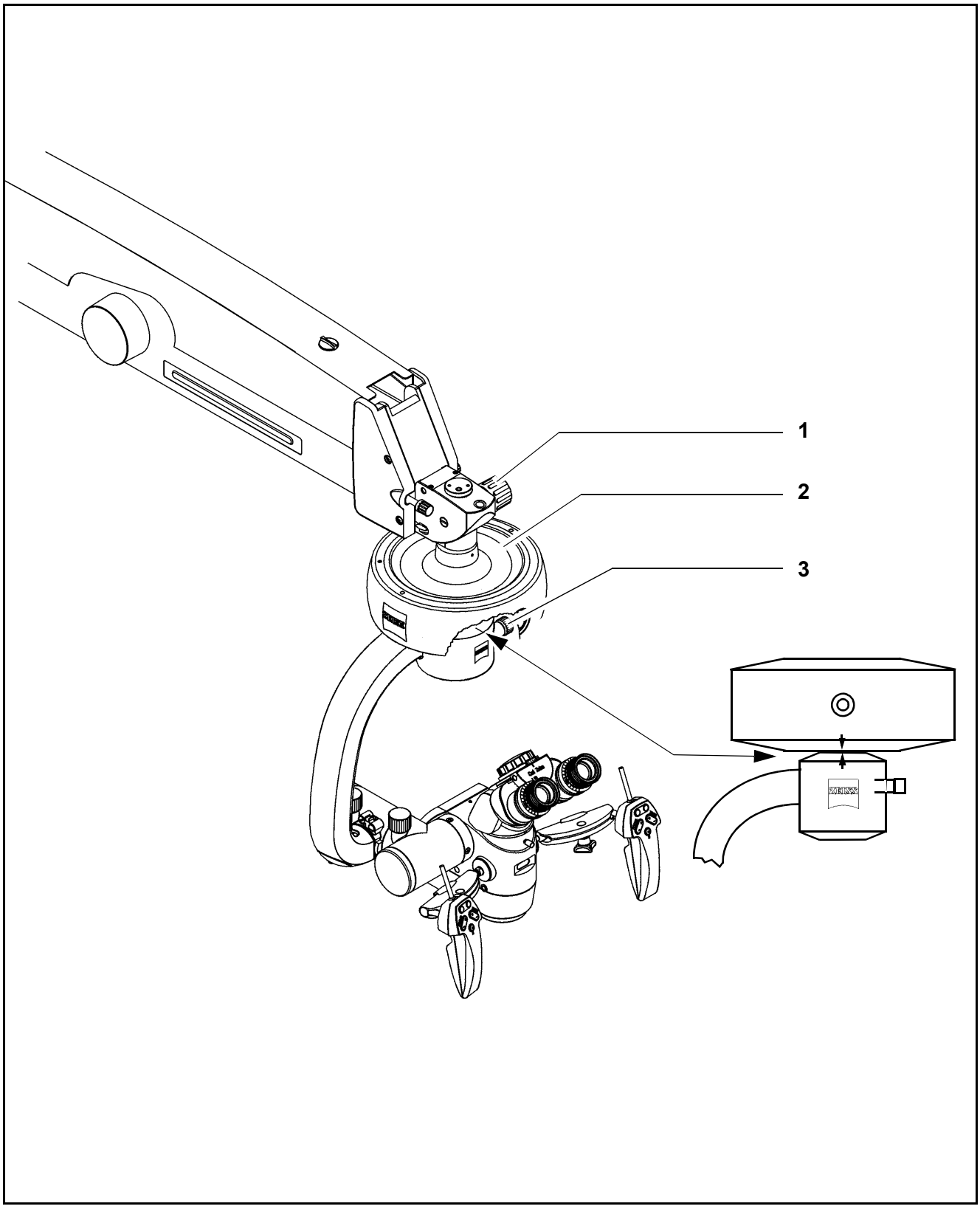
The X-Y coupling allows motorized fine positioning of the surgical microscope in a horizontal plane. The range of travel is 40 mm x 40 mm. The speed of travel can be set on the display field of the suspension system.

To ensure that the X-Y coupling of the surgical microscope is accurately positioned in the X and Y directions, proceed as follows:

- Tighten friction adjustment knob (1) and open knob (3) by a few turns.
- Arrows are provided at the bottom of X-Y coupling (2) and at the top of the magnetic brake. Turn the surgical microscope until the arrows point towards each other.
- Firmly tighten knob (3).

Note:
The surgical microscope and X-Y coupling are now permanently connected.

- Adjust the friction of the OPMI® rotary axis using knob (1).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Strain relief device on S88 floor stand

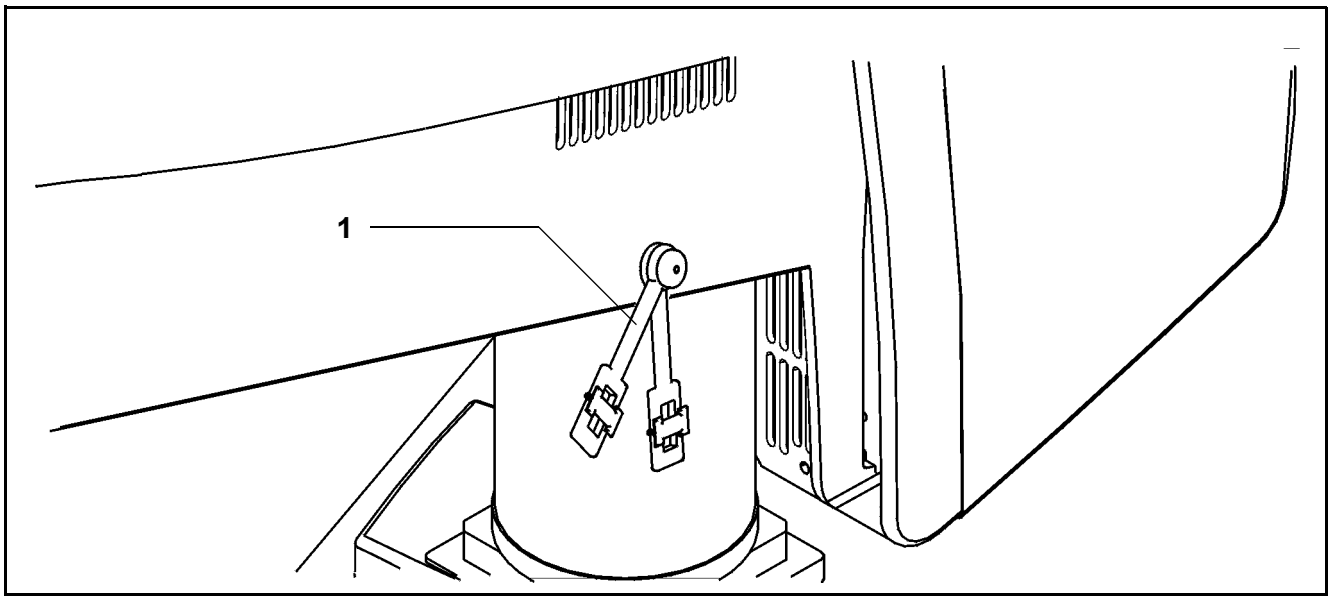
Note:
You can secure the power plug and the multipoint connector of the switching component against inadvertent loosening by installing the two cables in strain relief device (1).

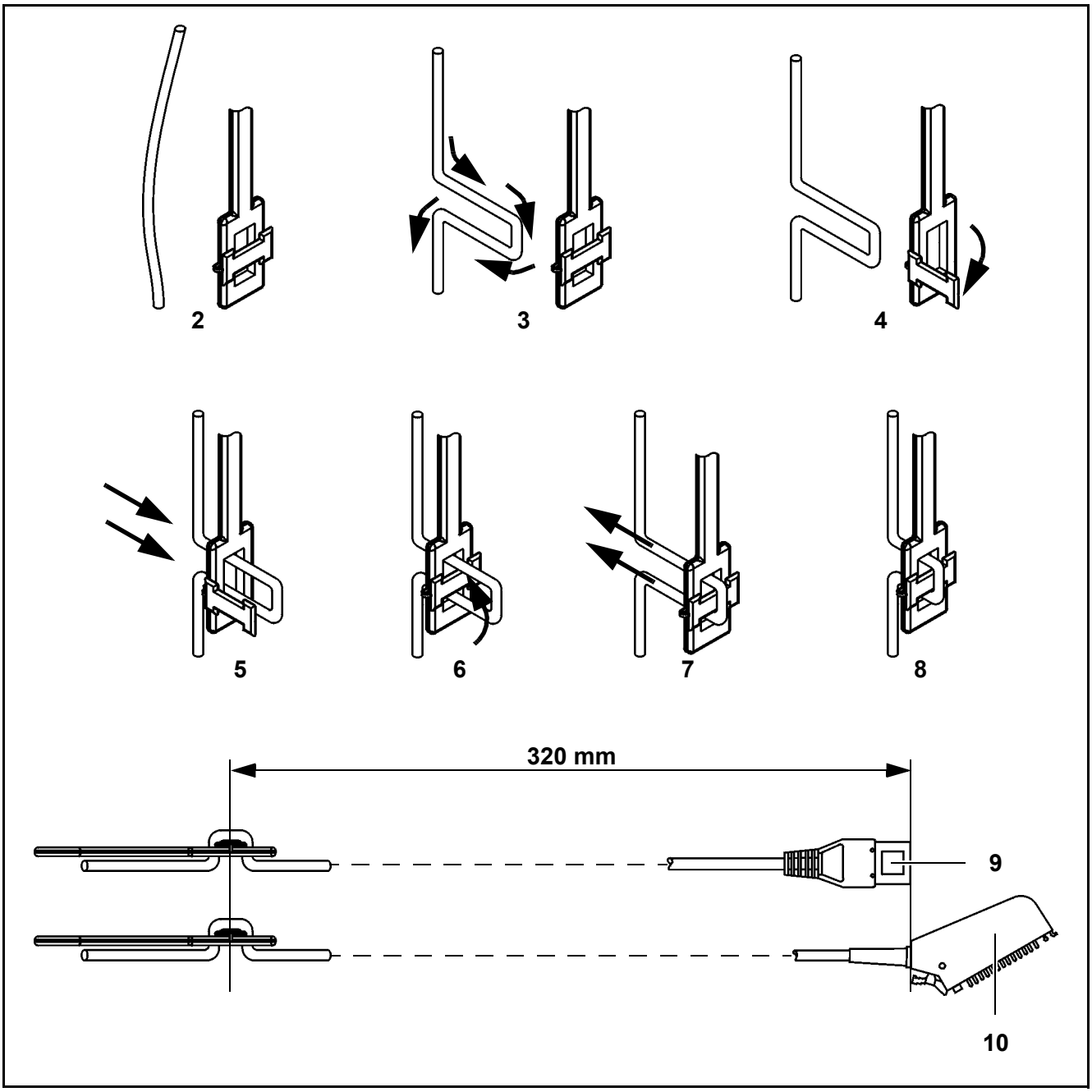
After you have mounted strain relief device (1), the cable must have the following length:

– 320 mm from the strain relief device up to and including power connector (9).

– 320 mm from the strain relief device up to connector (10) of the foot control panel or of an operating chair with appropriate footswitch.

- Form a loop with the cable as shown in (3).
- Open flap (4).
- Feed the cable through opening (5).
- Close flap (6).
- Tighten the cable until it encloses flap (7).
- Check the length of the cable.

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7
8
320 mm
9
10

Connecting the S88 floor stand

- Check the voltage indicated at (3).

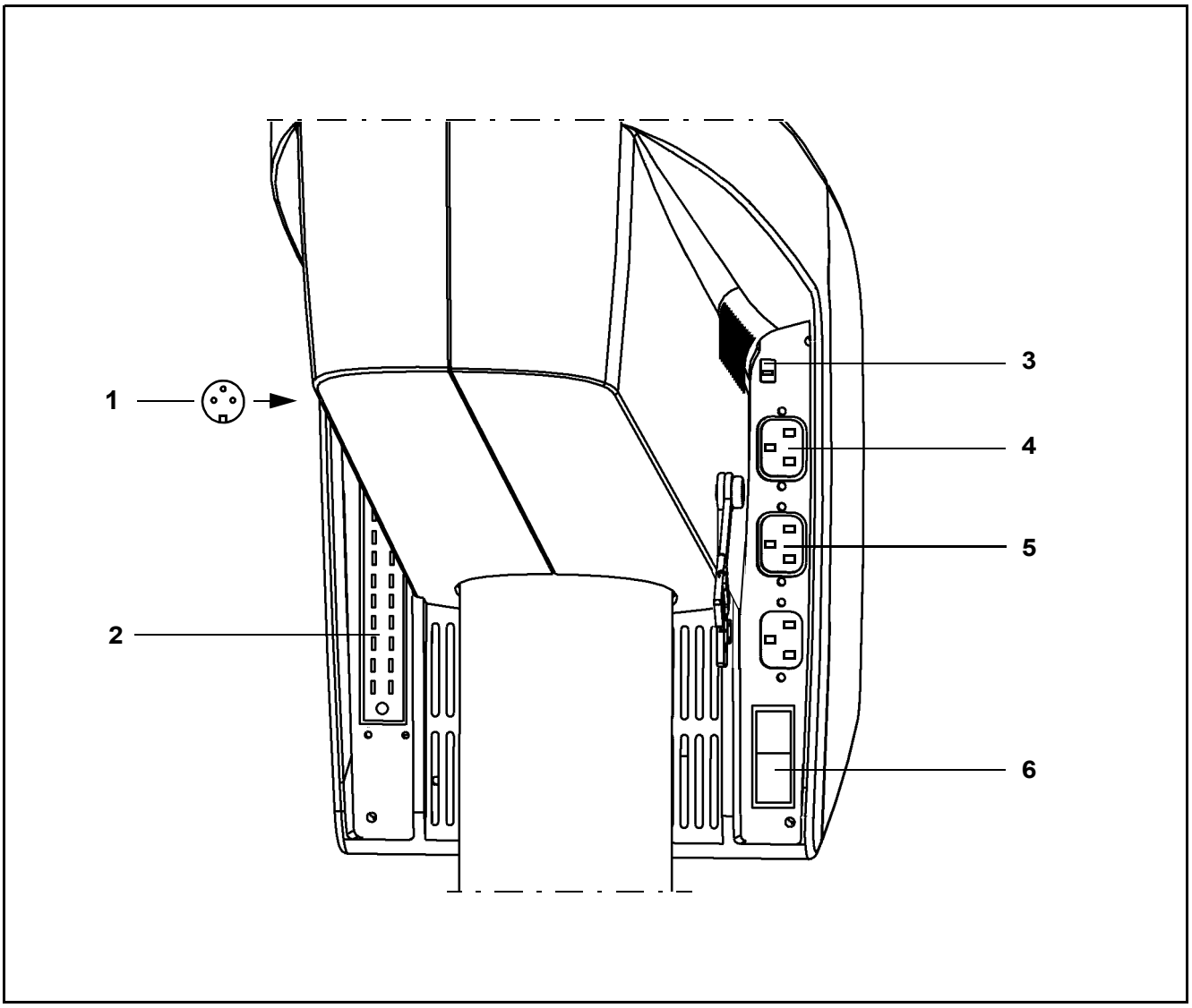
Caution:
The suspension system is set at the factory to the rated voltage used in the country of destination. The rated voltage indicated at window (3) must correspond to the rated voltage available on the site of installation. If this is not the case, you must re-adjust the sliding switch using a suitable tool.

Note:
Insert or remove connectors (2) and (4) only if power switch (5) is off.

- Plug the connector of the foot control panel or operating chair into connector (2) of the stand.
- Secure the microscope cable in the cable clip in such a way that it is not stretched or bent when the microscope is turned or tilted.
- Secure the light guide in the cable clip and insert the light guide into the light guide socket on the microscope as far as it will go. Make sure that the light guide is not stretched or bent when the microscope is turned or tilted.

Use remote control socket (1) to connect external instruments with max. 24 V / 0.5 A which can be switched on / off via an AUX-signal using the freely programmable buttons on the foot control panel.

Connect the suspension system to line power using the power cord intended for it. Only use a power outlet which is provided with a properly connected protective earth conductor.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Adjusting the supension system

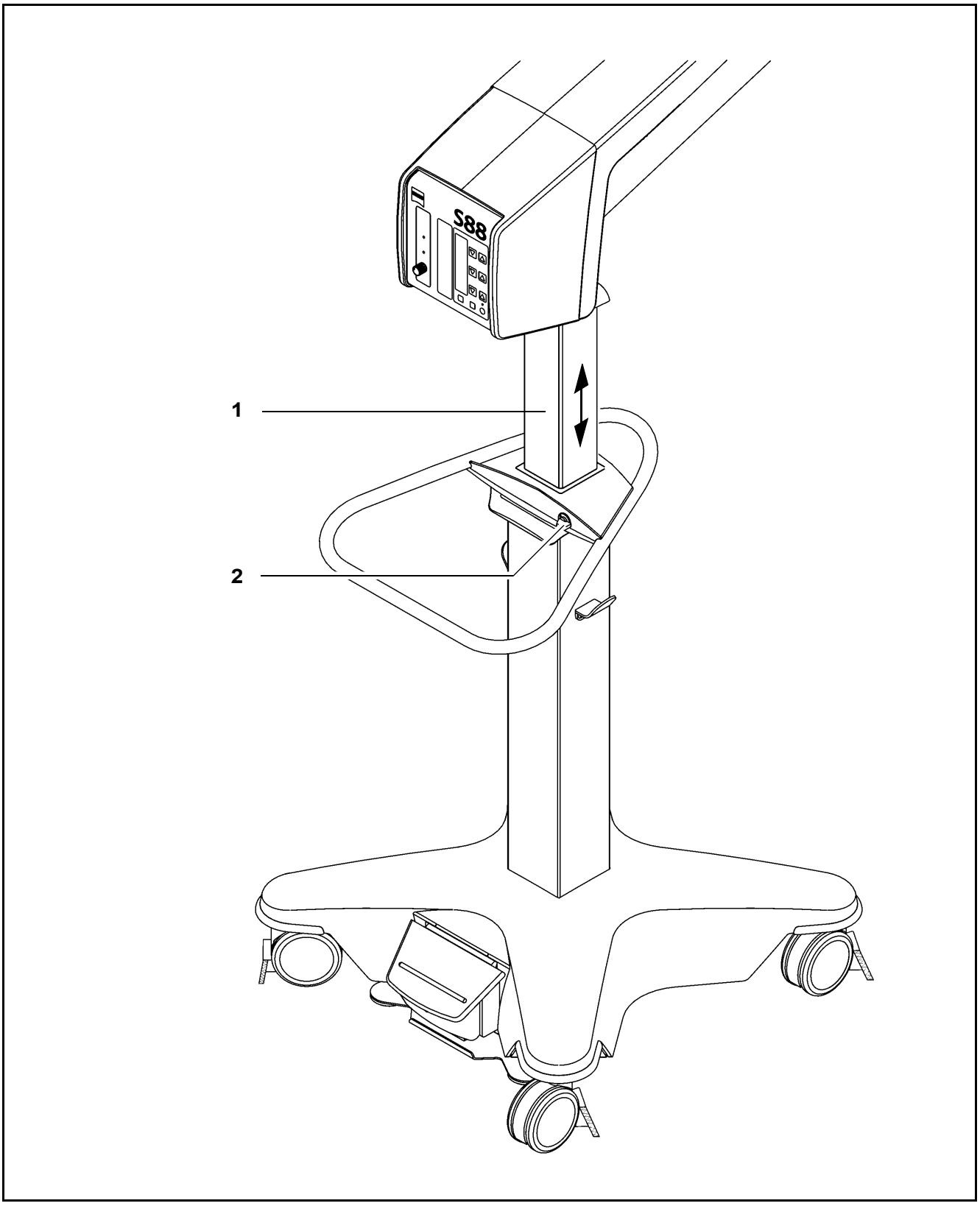
S88 floor stand with lifting column - Setting the ergonomic working height

Bring the surgical microscope into a position convenient for you before each surgical procedure, and set the optimum ergonomic working height of the suspension system via the lifting column (without patient!).

As long as you keep switch (2) pressed down, the lifting column (1) in the stand base moves upwards or downwards, depending on the position of the switch. When you release the switch, the lifting column stops immediately.
The switching technology causes a dead time of approx. 2 seconds at the upper and lower end positions of the lifting column. After this time, you can move in the opposite direction again by activating switch (2).

Note:
The lifting column is used to move the microscope into position for surgery prior to the surgical procedure.
Do not constantly move the lifting column up and down, since a thermal cut-out will then automatically deactivate the drive motor. If this occurs, the lifting column cannot be moved until the motor has cooled down.

Warning!
- Do not activate the lifting column during surgery!
- Do not use the lifting column for focusing.
  - by the motorized movement of the lifting column,
  - by the motorized focusing system,
  - by the movement of the suspension arm.


S88
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Adjusting the balance setting of the suspension arm

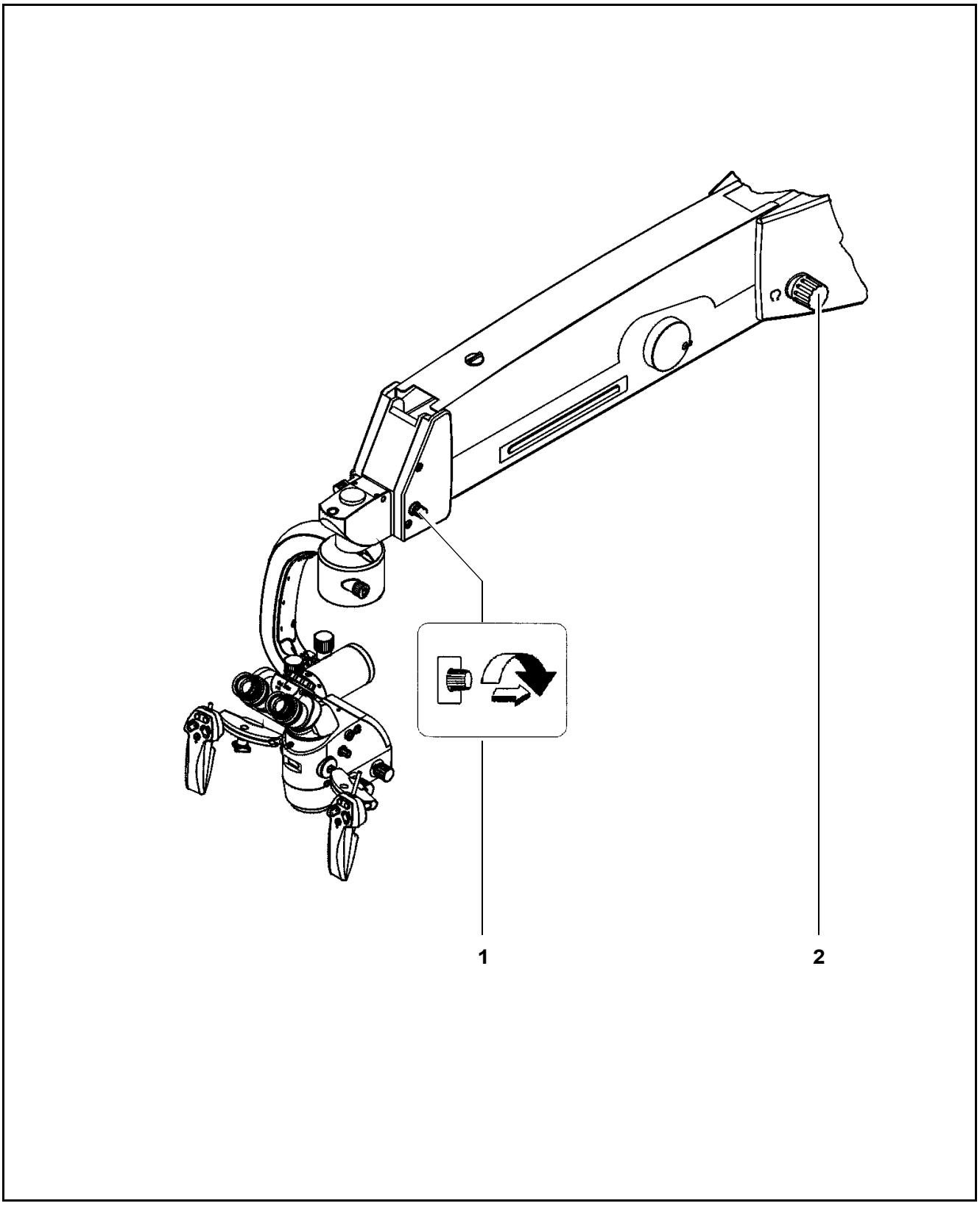
- Now perform the balance setting procedure with the complete microscope equipment attached!

Note:
Before you precisely adjust the balance setting of the suspension arm, we recommend performing a coarse balance setting of the arm. For this, the suspension arm must be locked in its horizontal position.

- To perform the coarse balance setting, move the suspension arm slightly up and down. At the same time, turn the adjustment screw (2) until you think that the spring force is sufficient to compensate for the weight of the surgical microscope and accessories.

Note:
Clockwise turning increases the spring force, counterclockwise turning reduces the spring force.

- Hold the suspension arm and pull out the locking knob (1). This must be possible without requiring a special effort. Otherwise, re-adjust the spring force using the adjustment screw (2).
- Press one of the release keys for the magnetic brakes on the microscope during the balance setting procedure. Move the suspension arm alternately up and down by approx. 20 cm. Using adjustment screw (2), adjust the spring force in such a way that the effort required to move the arm up or down is the same in both directions.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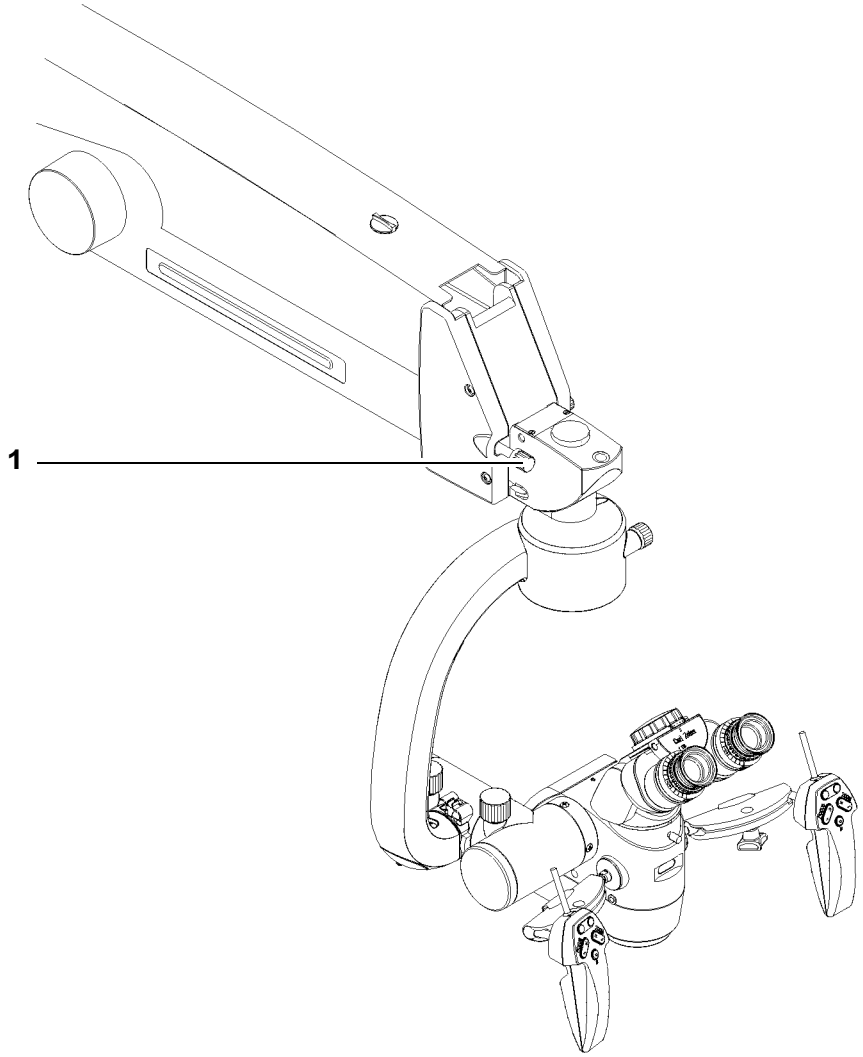
Adjusting the limit of downward movement

The vertical lift of the suspension arm must be limited in such a way that the patient's safety is also ensured when the microscope is inadvertently lowered.

- Loosen the adjustment screw (1) by a few turns.
- Press one of the release keys for the magnetic brakes on the surgical microscope and lower the microscope to a position where it can be focused on the surgical field (depending on the focal length of the objective lens) and where the safety distance to the surgical field is still sufficient.
- Turn the adjustment screw (1) clockwise as far as it will go.
- Move the surgical microscope again to the lower limit and check the safety distance.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Positioning the S8 ceiling mount

1 Working position

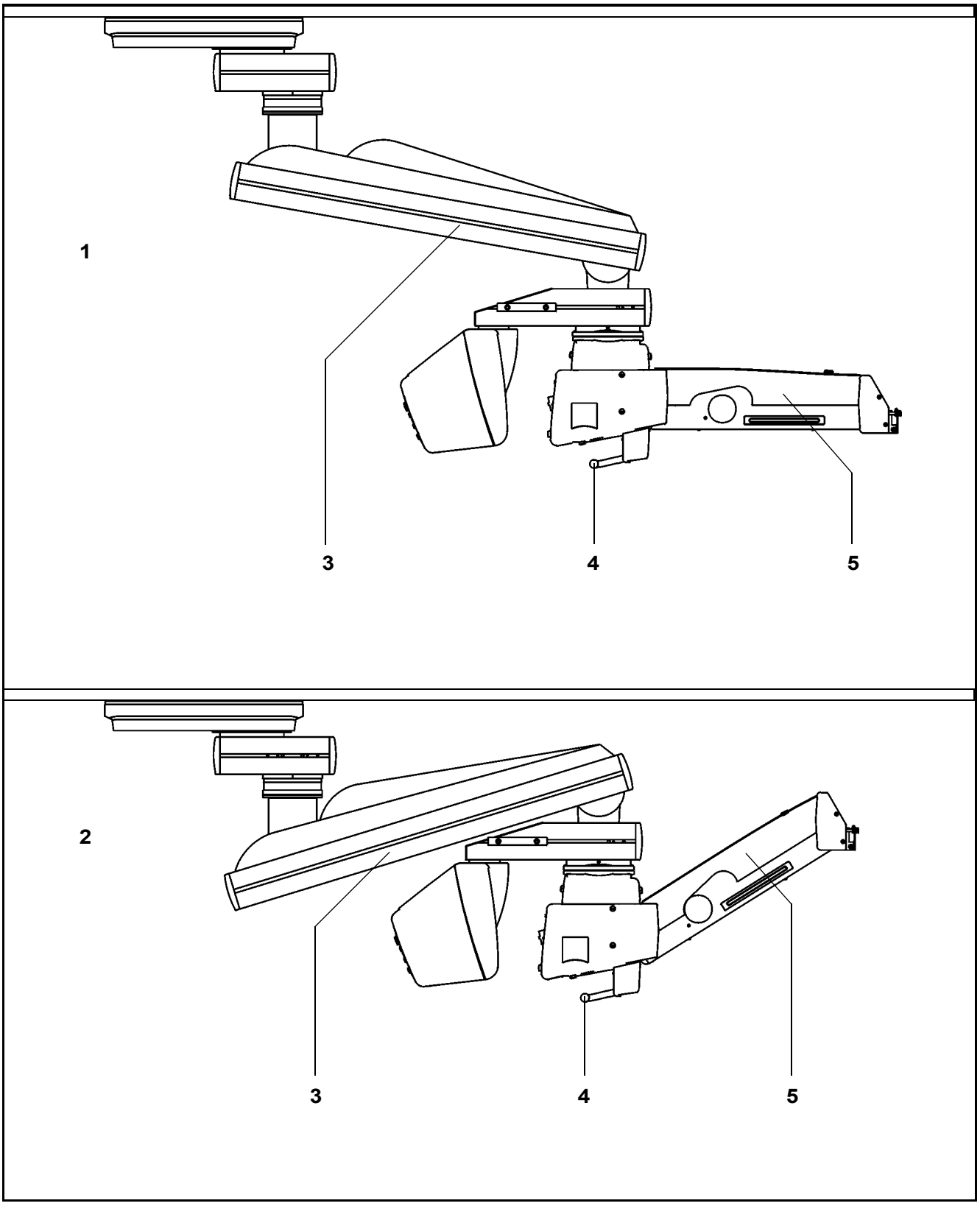
2 Standby position

Working position

- Pull the ceiling mount into the working position using the handle (4). The recommended height is approx. 1750 mm measured from the handle to the floor.
- When you release the handle (4), the lift arm (3) is locked in the working position (1).

Standby position

- Press the release key of the magnetic brakes on the surgical microscope. Move the suspension arm (5) to the highest possible position.
- Push the ceiling mount upward into the parking position using the handle (4). The standby position is the highest possible position.
- When you release the handle (4), the lift arm (3) is locked in the standby position (2).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Settings on the control and display panel

Adjusting the suspension system

- Turn on the suspension system at its power switch.
- Successively select the following functions on the suspension system:
  - lamp brightness,
  - motor speeds for zoom,
  - focus and
  - X-Y coupling.
- Set the lamp brightness as follows:

  Start with the minimum brightness setting, and gradually increase the brightness until the necessary and still admissible level has been reached.
  - Xenon: adjustment range: 1 ... 10
- Set the values required for
  - motor speeds of the functions zoom,
  - focus and
  - X-Y coupling.

  Motor speed
  Adjustment range: 1...10
  Level 1 corresponds to the lowest, level 10 to the highest motor speed.

Balancing the surgical microscope

Warning!
Balance the completely equipped surgical microscope before surgery without the patient.

To permit almost effortless guidance of the surgical microscope, the surgical microscope and the suspension system used must be correctly balanced. If the system is in an extremely unbalanced state, the unit can move uncontrollably out of position. For this reason, hold the surgical microscope tightly at its handgrips before releasing the magnetic brakes.

Note:
To set the balance of the microscope's axis of rotation, the lateral and front-to-back tilt axes and to adjust the friction of the axis of rotation, press the magnetic brake release button on one of the handgrips.

When adjusting balancing knobs (2 and 3), carefully turn them in either direction shown on the labels. To avoid damaging the balancing system, do not use force by turning the knobs too far.

- Turn on the instrument at the power switch of the suspension system.

Adjusting the friction of the axis of rotation

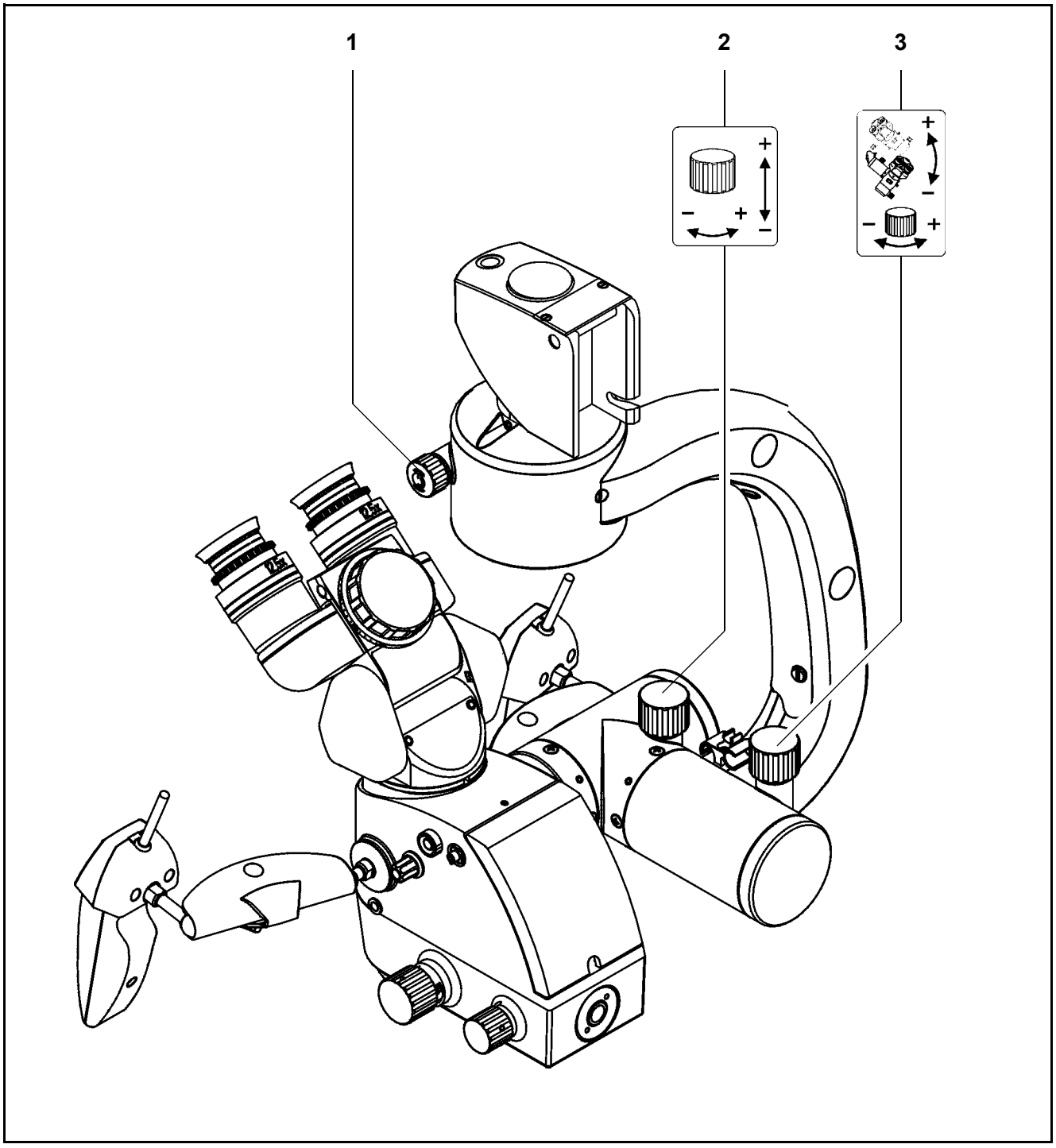
- Use knob (1) to adjust the friction of the microscope's axis of rotation as required.

Balancing the front-to-back tilt motion

- Use knob (2) to adjust the spring force in such a way that the surgical microscope is balanced about its front-to-back tilt axis and remains stationary in the viewing direction required.

Balancing the lateral tilt motion

- Use knob (3) to adjust the spring force in such a way that the surgical microscope is balanced about its lateral tilt axis and remains stationary in the viewing direction required.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Adjusting the surgical microscope

Bring the surgical microscope into its starting position within the focusing range. Adjust the minimum magnification on the surgical microscope. Bring the surgical microscope into the position required. Adjust your interpupillary distance on the binocular tube. Adjust your prescription on the eyepieces. Please note that instrument myopia may occur.

Emmetropes
adjust the diopter scale to 0 diopter (D).

Eyeglass wearers
(who perform surgery wearing their eyeglasses) adjust the diopter scale to 0 diopter (D).

Ametropes
(who know their prescription and perform surgery without wearing their glasses) adjust the diopter scale to their prescription.

Ametropes (who do not know their prescription and perform surgery without wearing their glasses)

Adjust both eyepieces on the main microscope to +8 D.
Adjust both eyepieces on the assistant's microscope to +8 D (if applicable).

Eyepieces without reticle:

Remove the binocular tube and the eyepieces from the microscope body and point them at a distant object*), i.e. use them like a pair of binoculars. The image of the object is still unsharp.

Turn the diopter scale of one eyepiece slowly clockwise until the object is imaged sharply. If necessary, repeat this procedure three times and take the average of the readings. Adjust the second eyepiece in the same manner.

Mount the tube and eyepieces on the microscope body and tighten the securing screw firmly.

Eyepieces with reticle:

Turn the diopter scale on the eyepiece slowly clockwise until the reticle is imaged sharply.

Focus the surgical microscope on the object. The reticle and the object must be in focus at the same time.

Adjust the second eyepiece in the same manner until the object is seen sharply.

Adjust the eyecups in such a way that you can see the full field of view. Adjust maximum magnification on the surgical microscope and focus on the object. Adjust the working magnification required. When the magnification is changed, the focal plane is retained, but the depth of field changes.

Note: If several surgeons use the instrument, it is advisable to draw up a table with the individual prescriptions and to keep it in a handy location near the instrument.

***) CAUTION:** Never use the sun as the distant object!

Surgical microscope with a laser micromanipulator

Please observe the separate user manual for your laser micromanipulator.

Warning!
It is absolutely vital that the focal planes of the surgical microscope and of the laser micromanipulator are identical.

Before every laser application of the surgical microscope using a laser micromanipulator, you must adjust the focal plane of the microscope to the focal plane of the laser micromanipulator. After correct matching of the two focal planes, the focus of the surgical microscope (Varioskop) must not be changed in order to avoid any deviations in the focal planes and, as a result, an unfocused laser beam during the laser application.
Always check the correct adjustment before surgery (without patient!) and before every laser application as follows (recommended procedure):

- Set the microscope to maximum magnification.
- Some micromanipulators offer the possibility of targeted laser beam defocusing in the focal plane. Make sure that the laser is in the position for the smallest possible laser spot for this check. Please observe the separate user manual for your laser micromanipulator.
- Hold a wooden spatula in the focal plane in such a way that you see it sharply focused.
- Trigger a few trial shots of the laser at the spatula, slightly changing the spatula position relative to the focal plane for each shot.
  The therapy beam of the laser displays its maximum effect in the focal plane of the laser micromanipulator. The wooden spatula must be sharply focused in this position. Only then will the two focal planes coincide. If this is not the case, correct the adjustment of the two focal planes.
- Repeat the test until full coincidence of the focal planes has been obtained.

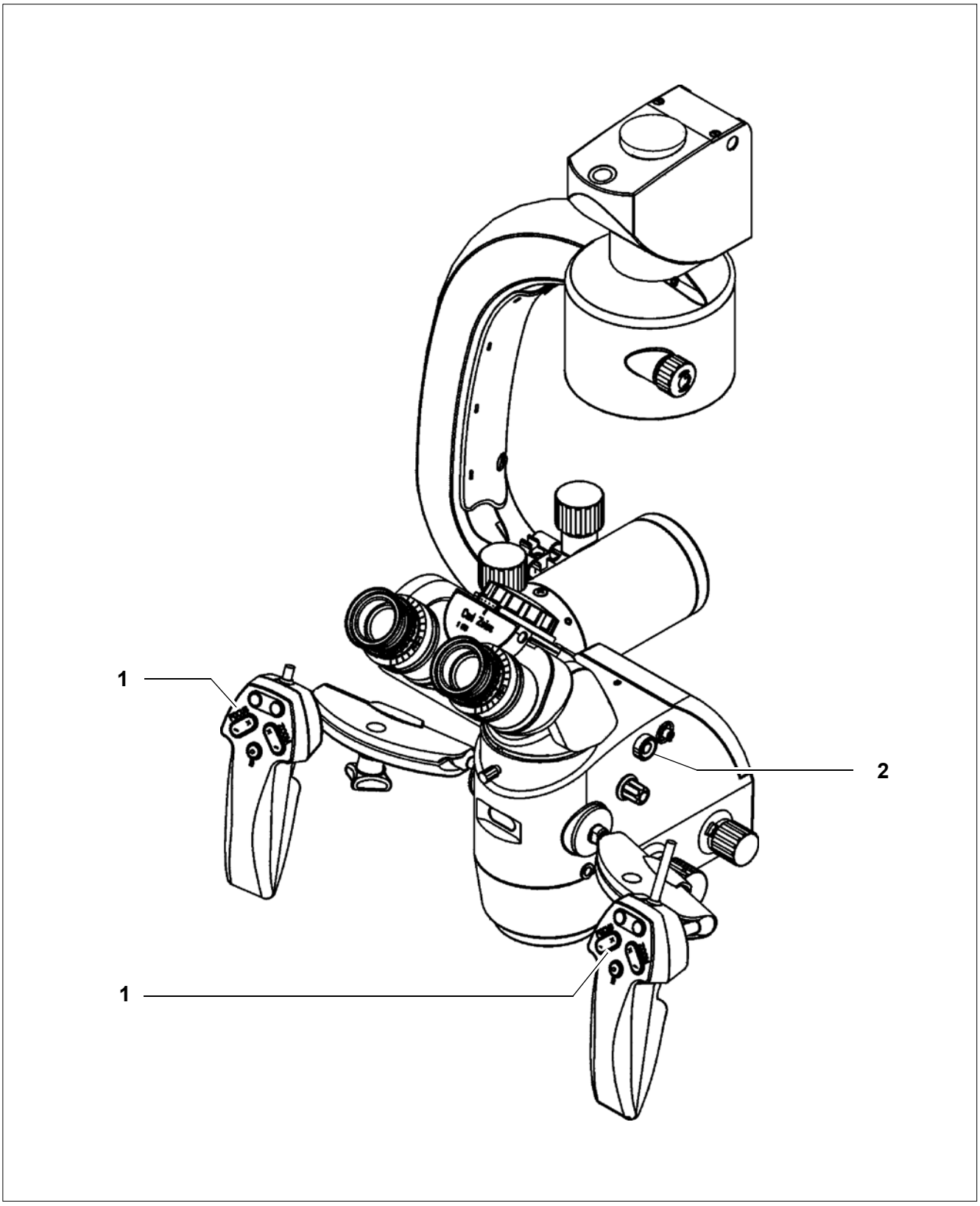
Adjusting the surgical microscope and laser micromanipulator to the same focal plane

The OPMI Vario is equipped with a motorized Varioskop zoom system which is operated via the focusing buttons of handgrip (1) or the foot control panel.

The Varioskop is used for the motorized setting of the working distance (coarse focus) and the motorized adjustment of image definition (fine focus). The focusing buttons allow you continuous adjustment of the working distance between 200 mm and 415 mm.

- Set the working distance (coarse focus) to the focus value of the laser micromanipulator. The display shows the focus value currently set.
- Use the previously described, recommended procedure to check that the focal planes coincide.
- If necessary, correct the focus by appropriate minor adjustment (fine focus).

Focus stop button (2) permits you to deactivate the electrical drive of the focusing system. The focus stop button is lit. This prevents the setting from being inadvertently changed by the motorized function.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Relocating the system

Note:
As the stand is very easy to maneuver, there is a tendency to underestimate its considerable weight. Therefore, move the stand slowly and carefully!

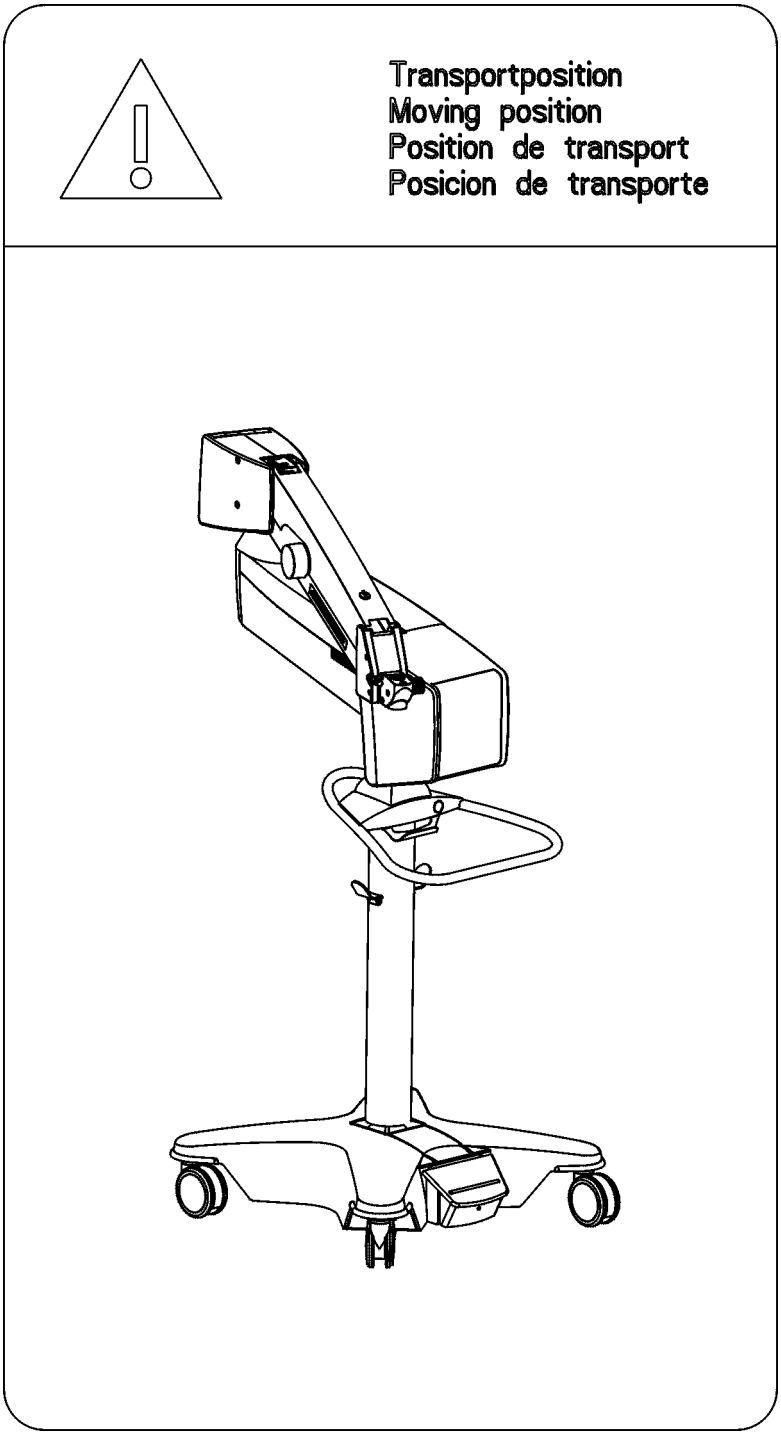
Please observe the following points when relocating the stand:

- Fold the suspension arm to its moving position (see illustration on the opposite page).
- Switch off the illumination system using the knobs, and the system at its power switch.
- Unplug the power cord from the wall outlet.
- Wind up the cable of the foot control panel on one of the cable supports, and hang the foot control panel on the handle.
- Wind up the power cord on the other cable support.
- Use the maneuvering handle for moving the stand.
- Be careful of heights when passing through doorways.
- Avoid collisions of any kind.

- Do not go over steps and edges: the stand might topple!
- Be extremely careful when moving over slopes.
- Do not park the stand on slopes.

Press the brake tab to lock the stand in position. Make sure that the stand is no longer able to roll away by itself.

Caution:
Over longer distances (e.g. removal, return for repair, etc), the instrument must always be transported in the original packaging or in special return packaging. For details, please contact your dealer or the Carl Zeiss service team.


Transportposition
Moving position
Position de transport
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Operation

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Failure of a xenon lamp 196

Failure of lamp control 200

Failure of the zoom function 201

Failure of the focusing function 202

Failure of magnetic brakes 203

Checklist

Warning!
If a function fails, you must not use this instrument for safety reasons. Correct the fault (see the "Troubleshooting table“) or contact our service dept.

Always check the following points before surgery (without patient!):

- Make sure that there is enough room between the instrument and the accessories installed and that the protective cover (2) is removed from the objective lens.
- Turn on the system at the power switch of the suspension system.

Illumination
– Check that light guide (7) has been connected.

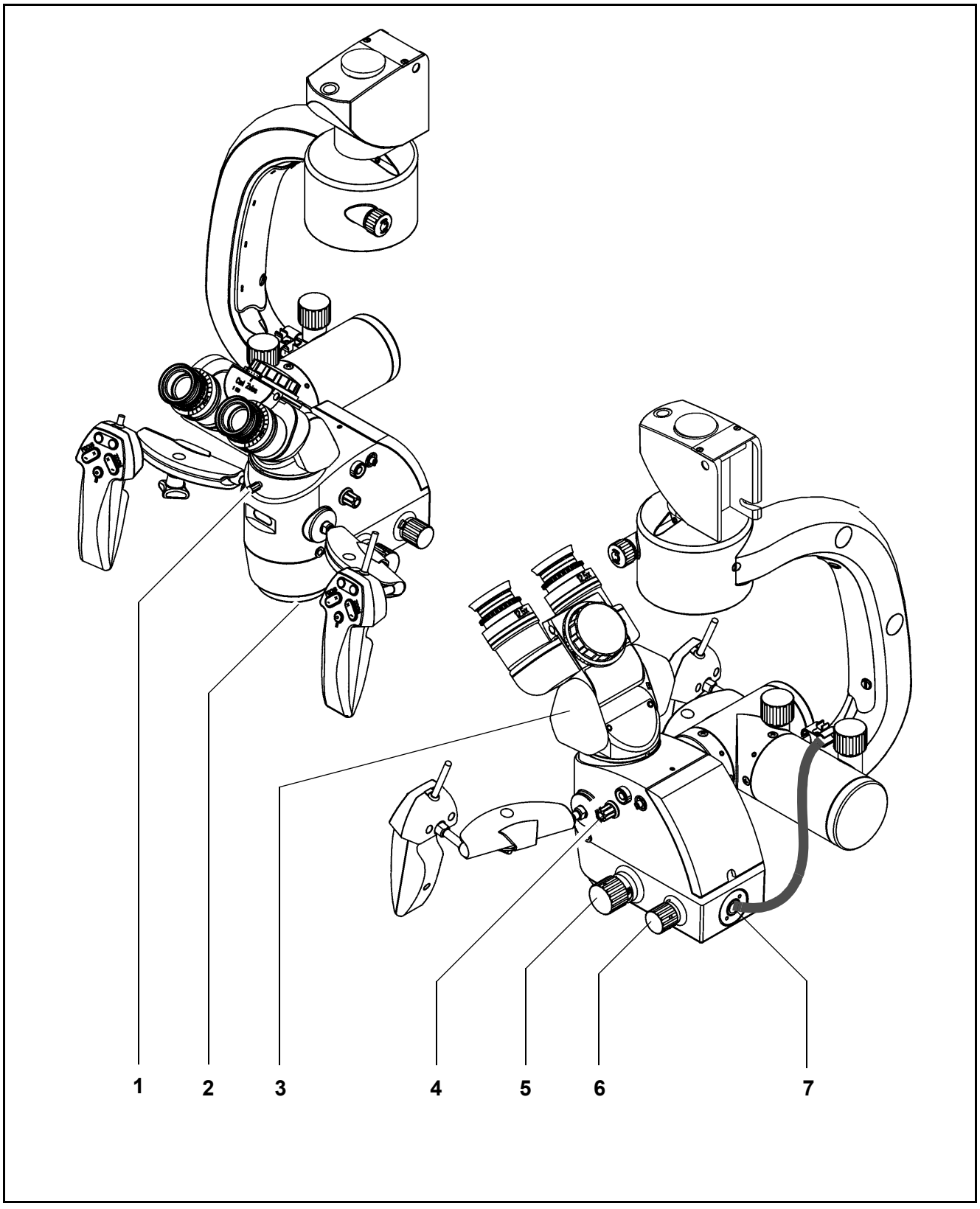
Zoom
– Check this function using the appropriate key.

Focus
– Check this function using the appropriate key.

Knobs
– Check the friction of the knobs for zoom (4), focusing (5) and illuminated-field size (6).

Eyepieces / binocular tube
– Check that binocular tube (3) has been securely mounted.
– Check that securing screw (1) has been firmly tightened.
– Check that the surgical microscope and the tube are in a position convenient for you.
– Check that the correct interpupillary distance has been set.
– Check that the eyecups have been adjusted in such a way that you can see the full field of view.
– Check that the correct prescription has been set on the diopter scale.
– Check that image quality is the same throughout the entire magnification range.

Balance
– Check that the surgical microscope has been correctly balanced.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Suspension systems

Note:
After switching on, the suspension system automatically performs a self-test which takes approx. five seconds.

Xenon illumination system

– A beep sounds after power-on of the system, and stops when the xenon lamp has ignited correctly and if no other error has occurred.
– If the beep does not stop, do not continue to operate the system.
– The xenon illumination is on and the green indicator lamp is lit.

Note:
If the first lamp has failed and the backup lamp is in use (red segment in the switching knob lights up), make sure to have a backup lamp module ready at hand as a precaution.

Warning!
The xenon lamp has a limited service life of 500 h.

If used beyond its maximum service life, the xenon lamp may explode.

Change the xenon lamp in good time.

Please note the following guidelines - example:

– If operated for 4 hours/day on 5 days/week, the lamp needs to be exchanged after 25 weeks maximum.
– If operated for 8 hours/day on 5 days/week, the lamp needs to be exchanged after 12 weeks maximum.

Lamp brightness

- Check that the lamp brightness display shows the minimum level (1.0) after power-on of the system.
- Change the lamp brightness across the entire control range, and check that brightness variation has an effect on the surgical field illumination (bright/dark).

S8 floor stand only: lifting column

– The function of the upward/downward movement is OK.
– Check that the surgical microscope is in a convenient position and that you have set the optimum ergonomic working height of the stand via the lifting column.

Balance setting

– Check that the suspension arm has been properly balanced. When the release button on the surgical microscope is pressed, the effort required to move the arm up or down must be the same.

Checking the limit of the suspension arm's downward movement

– The minimum working distance (height) from the surgical field has been set using the adjustment screw for limiting downward travel.

S88 floor stand only: stand base

– Check that the locking pedal has been pressed and that the stand is securely locked in position.

S8 ceiling mount only: grip

– Check that the working position has been set.

Check the accessories

– Using the manuals provided, check that the other equipment (surgical microscope, coobservation tube, video system, etc.) is functioning properly.

Foot control panel

– Check that the plug of the foot control panel has been connected.

– Check that the power switch of suspension system has been switched on.

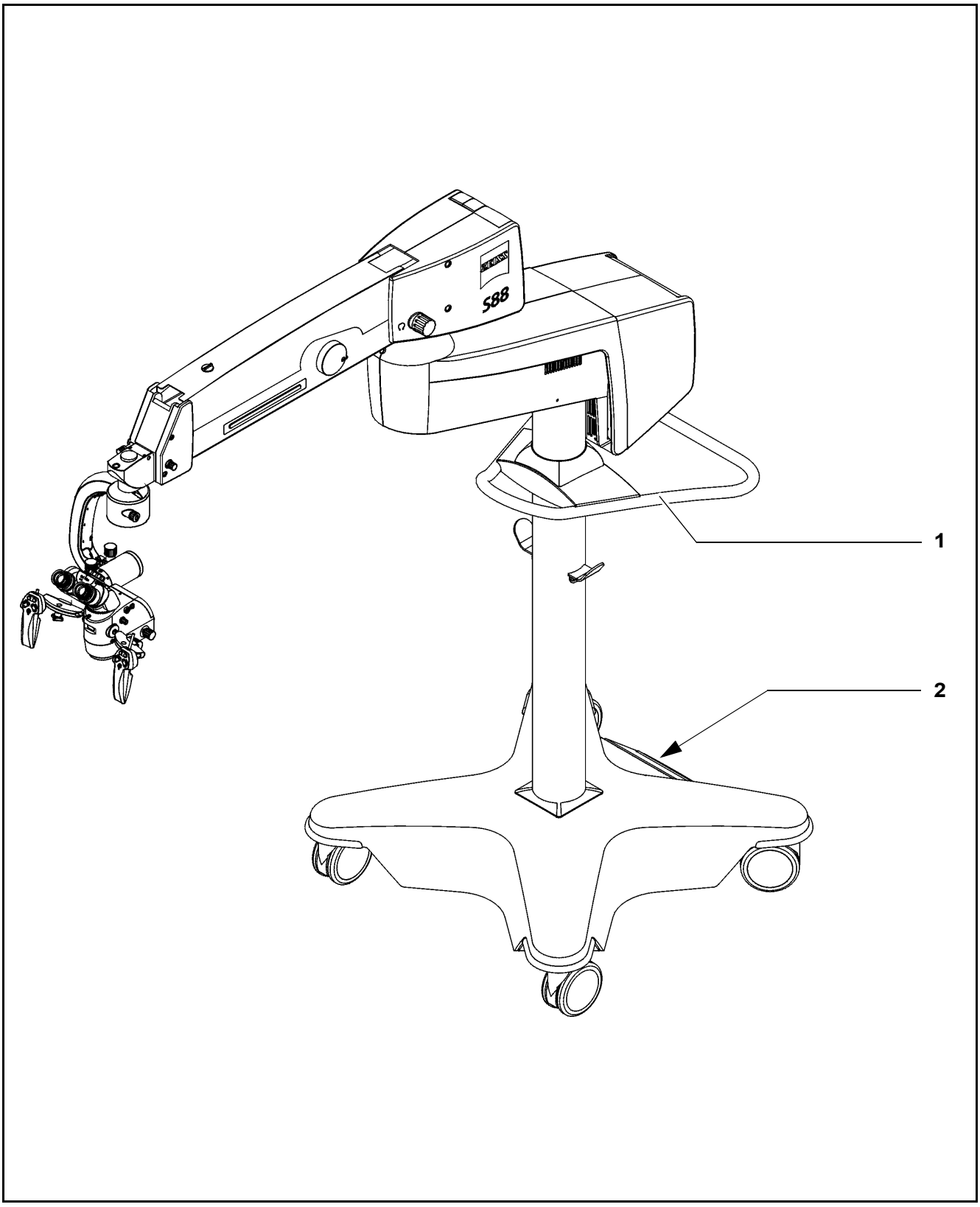
• Check that all functions assigned to the respective keys on the foot control panel are working properly.

Positioning the S88 floor stand

Note:
Please also read the chapter: "Relocating the stand", page 160.

- Unlock brake tab (2).
- Use maneuvering handle (1) to move the stand to the site of use. Make sure that movement is not obstructed by the power cord and the cable of the foot control panel.

Caution:
Press down brake tab (2) and make sure that the stand is securely locked in position and cannot roll away by itself.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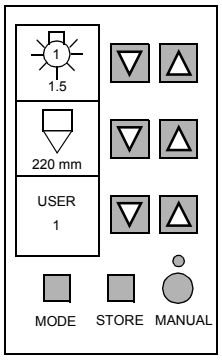
Using the display and key field

General functions



Operating the "∇" and "Δ" keys

The "∇" and "Δ" keys have been assigned to the display sections (LCD) located on their left respectively, i.e. they permit you to change the value or setting currently shown in the relevant display.

Every time you press the "∇" key, the displayed value is reduced in predefined steps until its minimum is reached.

Every time you press the "Δ" the displayed value is increased in predefined steps until its maximum is reached.

The "Δ" and "∇" keys have a repeat function, i.e. while you keep one of these keys pressed, the relevant value is automatically incremented/decremented in the predefined steps until its maximum/minimum is reached.

Operating the row of keys

"MODE" key
Press the "MODE" key to switch from the basic mode to the speed mode. The "MODE" key also brings you back from the speed mode to the basic mode.

In the configuration modes, use the "MODE" key to return to the basic mode.

"STORE" key
The function of the "STORE" key is dependent on the surgical microscope used. For details of the "STORE" key, see the user's manual of the relevant surgical microscope.

"MODE" key and "STORE" key
If you press the "MODE" and "STORE" keys simultaneously, you will get from the basic mode to the configuration mode 1. If you press the "MODE" and "STORE" keys simultaneously while you are in one of the configuration modes, the program jumps to the next configuration mode, and from the last configuration mode back to configuration mode 1, see the illustration "Overview of user interface".

Note:
If you have selected any of the modes and do not press a key in the key field, the program will return to the basic mode after 20 seconds.

"MANUAL" key

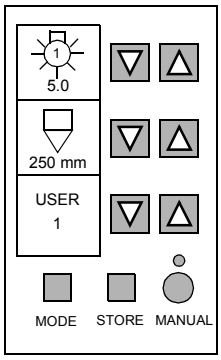
The "MANUAL" key permits you to switch to manual operation. The motorized control functions of the surgical microscope are deactivated. The lamp brightness is automatically adjusted to a fixed setting, the value being shown in the first display.
When the manual mode is activated, the yellow LED is lit and the word "MANUAL" blinks in the third display.

The surgical microscope can no longer be operated via the foot control panel, the handgrips or the display and key field.
In the manual mode, you can only switch the illumination on and off on the foot control panel and release the magnetic brakes by pressing the appropriate keys on the surgical microscope.

The selection of the manual mode is retained even if you turn the power switch of the instrument off and on again.

Press the "MANUAL" key once again to reactivate electronic control; the display in the display and key field then returns to the basic mode.

Basic mode



Basic mode

The basic mode is always displayed in the normal operating status and after power-on of the system.

In the basic mode, the following settings are displayed, depending on the installed surgical microscope:

In the upper display field	the current lamp brightness
In the middle display field	for OPMI® Vario on the suspension system: either the working distance or the total magnification
In the lower display field	the user ID

Setting the user ID (USER)

The lower display field in the basic mode generally shows the current USER, i.e. the user ID selected when the system was last switched off is displayed. When the user is changed, all settings for the newly selected user will be loaded, except the lamp brightness which is always set to the minimum value.

User data records can be stored for a maximum of 9 different users.

Use buttons "∇" and "Δ" assigned to the lower display field to select a user ID between 1 and 9.

Saving parameter settings
As soon as you have entered a parameter setting, it is saved under the current user ID.

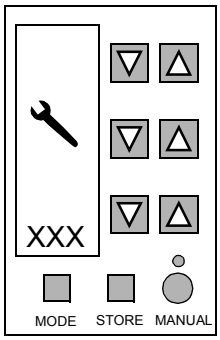
Note:
If possible, each user should be assigned his own user ID under which he can enter and save his specific parameter settings. This permits each user to call up his specific set of parameters via his user ID and to work with these settings.

Note:
Make sure not to change the settings of another user. It is advisable to work only under your own user ID, as all settings are always saved under the currently selected USER.

Acoustic signals

Three successive beeps	– Error message during the software check after power-on of the suspension system. – Error message in the case of an internal system error.
One beep	When the focus or zoom position is saved.
One beep	When brightness level 1.0 is reached.
One beep	After power-on of the suspension system.
Intermittent beep	Error of the illumination system.

Service display



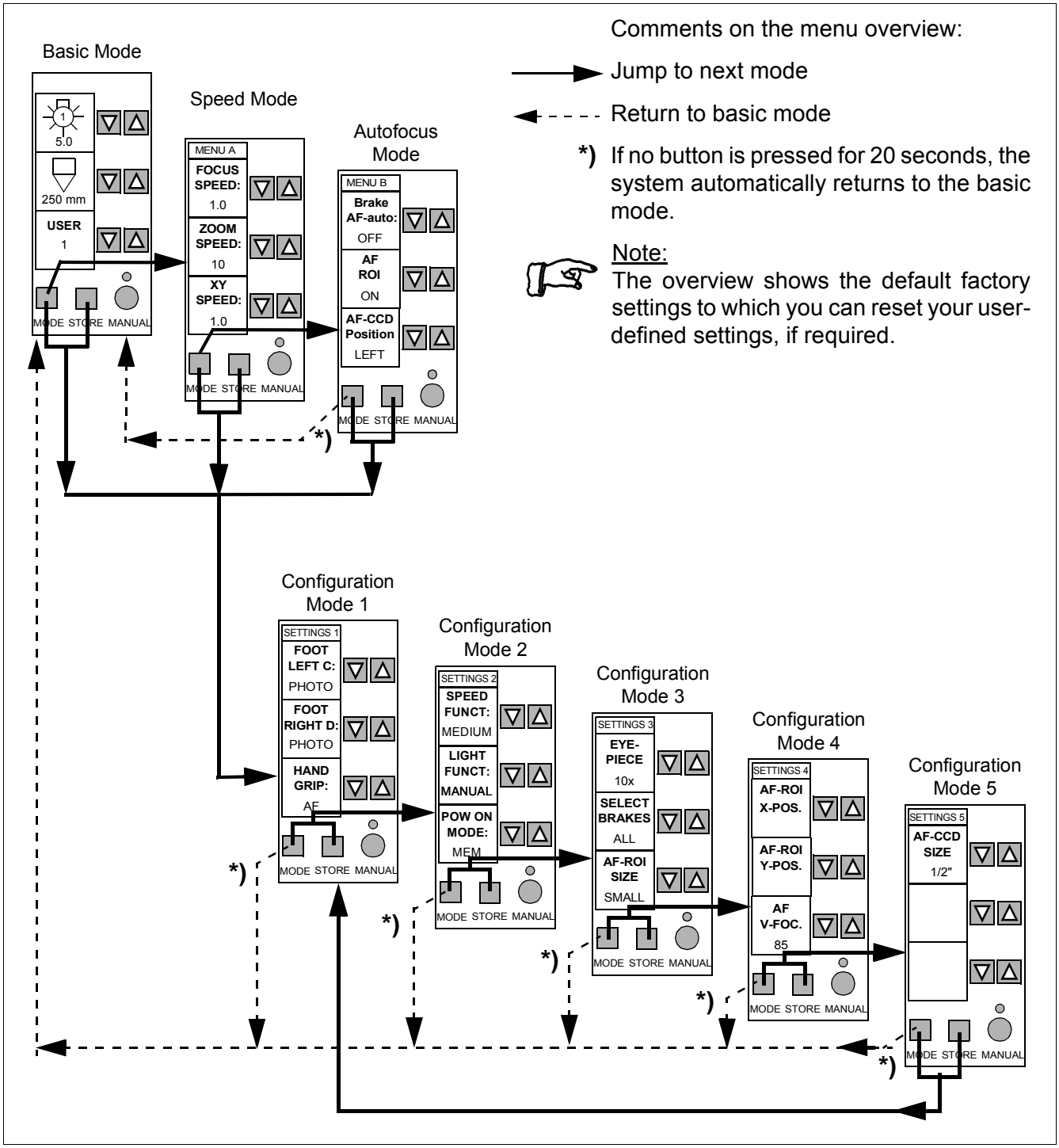
In the event of an error, e.g. during the system check after power-on of the suspension system, an error message appears in the control and display panel: a wrench symbol and an error code (XXX) are displayed and three successive beeps are heard.

Inform the service department, telling them the error code and the serial number of the system.

Motorized control of the surgical microscope is then no longer possible. All microscope functions except recentering of the X-Y coupling can only be operated manually.
However, you can still release the magnetic brakes using the appropriate button on the left and right handgrips of the microscope.

When you press the "MANUAL" key, the surgical microscope can no longer be operated via the foot control panel, the handgrips or the control and display panel.
You can continue using the illumination system, but the lamp brightness is automatically adjusted to a fixed setting. You can use the foot control panel to switch the illumination system on and off.

OPMI Vario on the suspension system, user interface with SpeedFokus option



Overview:
Control functions for OPMI Vario with SpeedFokus (autofocus).

Basic mode see page 172 – Setting the lamp brightness – Display of working distance or total magnification, display switchover – Setting the user ID	**Speed mode** **(Menu A)**, see page 179 – Setting the speed for focusing – Setting the speed for the zoom function – Setting the speed for the X-Y coupling	**Autofocus mode** **(Menu B)**, see page 181 – Automatic focusing after locking of the magnetic brakes (on / off) – Display of the ROI (region of interest) on/off – Entering the video camera orientation (left/right)
Configuration mode 1 **(Settings 1)**, see page 183 – Assigning a function to button C of the foot control panel – Assigning a function to button D of the foot control panel – Assigning a function to the freely configurable handgrip buttons	**Configuration mode 2** **(Settings 2)**, see page 186 – Setting the focus speed depending on the zoom setting – Setting the brightness depending on the zoom setting – Setting the power-on behavior	**Configuration mode 3** **(Settings 3)**, see page 189 – Entering the current eyepiece magnification for the calculation of the total magnification displayed in the basic mode. – Selecting the magnetic brakes to be unlocked by pressing handgrip buttons B – Setting the ROI size
Configuration mode 4 **(Settings 4)**, see page 192 – Defining the position of the ROI. – Entering the video focal length	**Configuration mode 5** **(Settings 5)**, see page 193 – Entering the size of the video camera's CCD array	

The control functions are explained in more detail in the following sections.

Note:
The functions of the SpeedFokus (autofocus) option are only displayed in the user interface for OPMI Vario on a suspension system if this option has been actually installed. The special functions of the SpeedFokus (autofocus) option comprise:

– Video-AF mode (MENU B), complete

– AF-ROI SIZE function in configuration menu 3 (SETTINGS 3)

– Configuration menus 4 and 5 (SETTINGS 4 and 5), complete

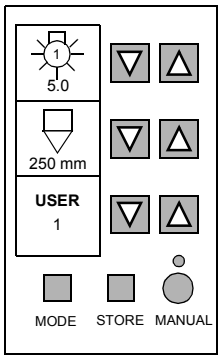
"STORE" key
The focusing and zoom values currently set on the surgical microscope are saved for the user currently selected. The function of the "STORE" key is the same in all modes.
The current focusing and zoom values are stored as focus memory (FOC-MEM) and zoom memory (ZOOM-MEM).
To set the instrument to these stored focusing and zoom values, press keys C and D on the foot control panel or the freely configurable keys on the handgrips, see configuration mode 1.

Caution:
Be extremely careful when changing these settings. You should change settings only under your own user ID. Notify all users of any changes, or make sure that each user only works under his own user ID.

Adjusting the settings
The associated buttons "∇" and "Δ" allow you to change the settings in defined steps.

Saving parameter settings
As soon as you have entered a parameter setting, it is saved under the current user ID.

Basic mode



Basic mode for OPMI Vario

The basic mode for OPMI Vario comprises the following functions:

– Setting the lamp brightness

– Switching the display between working distance and total magnification

– Setting the user ID, menu item "USER".
For details, please see page 172

Path: The basic mode is automatically displayed after the instrument has been switched on.

Setting the lamp brightness (OPMI Vario)

This function permits you to set the lamp brightness. In the basic mode, the lamp brightness currently set is shown in the upper display field.

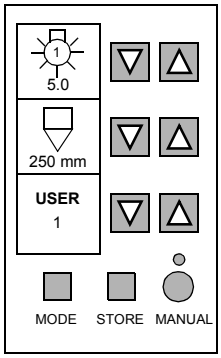
Setting the lamp brightness:
Use the associated buttons "∇" and "Δ" to adjust the lamp brightness. The brightness can be varied in a range from 1 to 10 in steps of 0.5.
The last setting of the lamp brightness is automatically saved under the current user ID.

Notes:

– In the adjustment performed here, you set a fixed basic brightness of the illumination. In configuration mode 2, you can select automatic (AUTO) for "Brightness as a function of the zoom position" (LIGHT FUNCT:).
The automatic function ensures that you have an image of constant brightness across the entire zoom range (0.4 to 2.4). From zoom value 1 onwards, the transmission of the optical system decreases with increasing magnification. The automatic function compensates for this by increasing the lamp brightness appropriately.
If you have selected a relatively high basic brightness for a large field of view (low zoom value), the automatic function is unable to sufficiently compensate for the reduced transmission of the optical system resulting from high zoom values.

– You can also adjust the brightness of the lamp by pressing the appropriate key on the foot control panel or handgrip.
In configuration mode 1, you can assign the increase/reduce brightness function to the freely configurable keys on the handgrip.

Basic mode



Display of the working distance or total magnification (OPMI Vario)
This function permits you to switch between displays.

In the basic mode, either the working distance (in mm) or the total magnification (as a factor) is displayed in the middle display field.
The associated buttons "∇" and "Δ" allow you to switch between these displays.

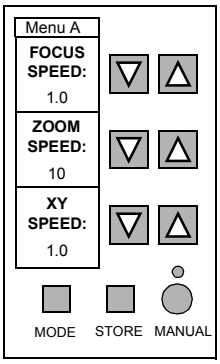
Displaying the working distance:
The working distance is displayed as a symbol and a numeric value which indicates the current working distance in millimeter. The current working distance is displayed in 5 mm steps.

Displaying the total magnification (MAG):
The total magnification of the optical system is displayed as the abbreviation MAG and a numeric value (factor) which indicates the current total magnification in steps of 0.1.The total magnification is calculated by the software. For this purpose, the magnification of the eyepieces currently used must be known to the software. Use configuration menu 3 to enter the current eyepiece magnification.

Setting the user ID
Menu item USER, for details see page 172.

Path: To access the speed mode (MENU A), press the MODE button in the basic mode.
To change to configuration mode 1 (SETTINGS 1), press the MODE and STORE buttons simultaneously.

Speed mode



Speed mode for OPMI Vario (MENU A)

This mode permits you to set the adjustment speeds for the following microscope functions:

– Focusing

– Zoom function

– Adjustment of the X-Y coupling

Path: Every time you switch on the system, the basic mode is automatically displayed. Press the MODE button to access the speed mode (MENU A).

Adjusting the settings
The speed mode is the user interface which allows you to set the speeds of the microscope functions.

Each of the three adjustment speeds can be set in a range from 1 min. to 10 max. in steps of 0.5.

Optical systems provide a large depth of field if small zoom values are used. In the case of a large depth of field, the focusing system must travel a large range until the image is in focus. This means that the X-Y coupling must be adjusted over a large range until the required position is reached. This will take some time. A high adjusting speed is therefore a great benefit.
On the other hand, optical systems provide a small depth of field if high zoom values are used. This requires precise positioning of the focusing system in a small range to ensure that the image is in focus. This means that the X-Y coupling must be precisely adjusted within a small range until the required position is reached. A low adjusting speed is of advantage in this case.
Select the adjusting speed for the focus as appropriate for your working method.

Note:
The "SPEED FUNCT" function in configuration mode 2 permits you to select dynamic speed control for focusing and for the X-Y coupling as a function of the zoom setting.
You can select a high, medium or low value for the dynamic change of speed, or deselect dynamic speed control.
If you have already set a high adjustment speed for focusing and the X-Y coupling in the speed mode, dynamic speed control may possibly not be effective across the entire zoom range, as the maximum adjustment speed is reached beforehand. For further details, please see configuration mode 2.

Path: To return to the basic mode, press the MODE button in the speed mode (MENU A), or do not press any button for 20 seconds. To change to configuration mode 1 (SETTINGS 1), press the MODE and STORE buttons simultaneously.

SpeedFokus autofocus option

The SpeedFokus autofocus option permits you to select and automatically focus on a feature in the ROI (region of interest, measuring field) in the image of the surgical field. Prerequisite for the SpeedFokus (autofocus) option: a suitable video system must be installed on your OPMI Vario surgical microscope on the suspension system, and must be switched on.
The SpeedFokus (autofocus) function is based on the evaluation of the video image contrast: during focusing of the microscope's Varioskop optics, SpeedFokus continuously determines the video image contrast in the selected ROI. In this way, SpeedFokus controls the microscope's Varioskop optics and adjusts it to the point of maximum contrast, corresponding to the point of maximum image definition.

Caution:
Glare in the video image may impair the SpeedFokus function.

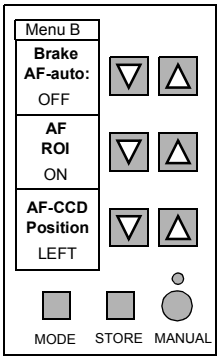
OPMI Vario: Autofocus mode (MENU B)

The autofocus mode (Menu B) is only displayed if the SpeedFokus (autofocus) option has been installed in your system.

Path: Every time you switch on the system, the basic mode is automatically displayed. Press the MODE button twice to access the autofocus mode (Menu B).

The autofocus mode (Menu B) permits you to make the following settings:

Autofocus mode



– Brake AF-auto, ON / OFF: activating / deactivating automatic focusing after locking of the magnetic brakes
– AF ROI, ON / OFF: activating / deactivating the ROI display on the video monitor
– AF-CCD Position, LEFT / RIGHT: video camera orientation, left / right

Note:
Further settings for the SpeedFokus (autofocus) option can be made in configuration menus 3, 4 and 5 (SETTINGS 3, 4 and 5). For details, please see the description of the configuration menus.

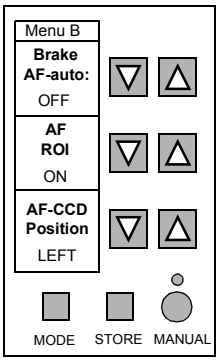
Automatic start of focusing on / off
Menu item "Brake AF-auto, ON / OFF" permits you to activate or deactivate the automatic start of the focusing process.

For changing the position of the surgical microscope, you have to release the magnetic brakes of the suspension system. Press the release button for the magnetic brakes on one of the handgrips. The magnetic brakes of the suspension system are unlocked for as long as you press one of these release buttons.

If you have selected "Brake AF-auto, ON", focusing by the SpeedFokus (autofocus) option will start automatically as soon as the magnetic brakes have been locked, i.e. as soon as you let go of the release buttons.

Autofocus mode

If you have selected "Brake AF-auto, OFF", focusing by the SpeedFokus (autofocus) option will not start automatically when the magnetic brakes are locked, i.e. when you let go of the release buttons
You can trigger the focusing process using the handgrips or the foot control panel. Prerequisite: AF, the SpeedFokus (autofocus) option, has been selected in foot control panel menu "FOOT LEFT C:" or "FOOT RIGHT D" (for foot control panels with 8 or 14 functions) or in handgrip menu "HANDGRIP:".



Note:
You can stop focusing by the SpeedFokus (autofocus) option by pressing one of the release buttons on the handgrips or on the foot control panel (with 8 or 14 functions) during the focusing process.

ROI display on the video monitor on/off
The position and size of the ROI are displayed on the video monitor in the form of a square frame.
Use the "AF ROI, ON / OFF" function to activate or deactivate this display on the video monitor.

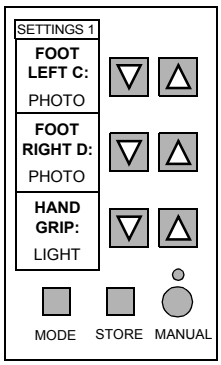
Entering the video camera orientation
If you are using an external video camera, the orientation of the video camera must be known to the SpeedFokus (autofocus) option.

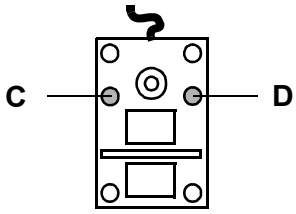
Note:
The OPMI Vario surgical microscope can only be equipped with an external video camera. An integrated video camera is not possible.

Caution:
The video image must have the same orientation as the image in the main eyepieces of the surgical microscope.
In addition, SpeedFokus needs the information whether the video camera is connected on the left or right, i.e. whether it is connected to the LEFT or RIGHT main beam path, to enable the function to perform corrections in the right direction during the focusing process. Use the menu item "AF-CCD Position, LEFT / RIGHT" to enter the orientation of the video camera.

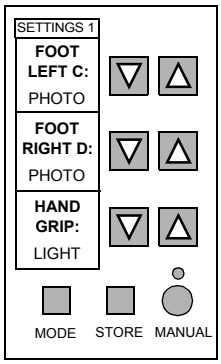
Path: You return to the basic mode if you press the MODE button in the Autofocus mode (MENU B) or if you do not press any button for 20 seconds.
To change to configuration mode 1 (SETTINGS 1), press the MODE and STORE buttons simultaneously.

Configuration mode 1





Configuration mode 1



Configuration mode 1 for OPMI Vario (SETTINGS 1)

Configuration mode 1 for the OPMI Vario permits you:

– to assign a function to buttons C and D of the foot control panel, menu items "FOOT LEFT C:" and "FOOT RIGHT D:"

– to assign a function to the freely configurable handgrip buttons, menu item "HANDGRIP:"

Path: After you have switched on the instrument, the basic mode is automatically displayed.
To access configuration mode 1 from the basic mode, simultaneously press the "MODE" and "STORE" keys.

<u>Assigning a function to foot control panel buttons C and D (OPMI Vario)</u>
Buttons C and D of the foot control panel can be configured as required.

The menu items "FOOT LEFT C:" and "FOOT RIGHT D:" permit you to assign one of the following functions to buttons C and D:

Display	Function of button C or D of the foot control panel		
XY-RES	XY recentering ("RESET")		
FOC-MEM	Focus memory	pressed for < 2 sec: pressed for > 2 sec:	triggers positioning saves position
ZOOM-MEM	Zoom memory	pressed for < 2 sec: pressed for > 2 sec:	triggers positioning saves position
PHOTO	Triggering an exposure via the camera interface, i.e. triggers the shutter of a connected 35 mm camera.		
AUX	Triggering an AUX signal via the AUX interface, e.g. to switch an external instrument on or off (see remote control socket on the connector panel of the suspension system).		
AF	Triggering the autofocus option		

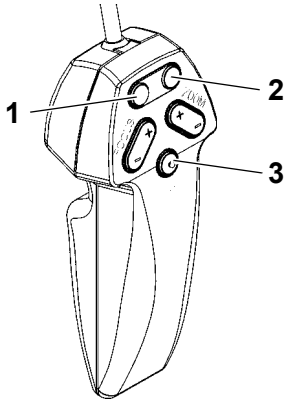
FOOT LEFT C:
Use the upper display and key field (FOOT LEFT C:) to assign one of the possible functions to button C of the foot control panel.

FOOT RIGHT D:
Use the middle display and key field (FOOT RIGHT D:) to assign one of the possible functions to button D of the foot control panel.

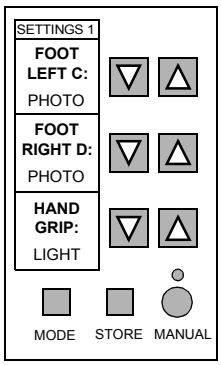
Roll-over procedure:

→ AF → XY-RES → FOC-MEM →
↑ ↓
← AUX ← PHOTO ← ZOOM-MEM ←

If you have assigned FOC-MEM to key C or D of the foot control panel, you can determine by the length of time for which you press the relevant key of the foot control panel during operation whether a positioning run is to be triggered (press the key for less than 2 seconds) or whether the current position is to be saved (press the key for more than 2 seconds).



Configuration mode 1



Assigning a function to the freely configurable handgrip buttons

The two upper buttons (1 and 2) on the left and right handgrips of the OPMI Vario surgical microscope are freely configurable.

Use the menu item "HANDGRIP:" to assign one of the following functions to the handgrip buttons:

Display	Function of the left button (1)	Function of the right button (2)
LIGHT	Reducing brightness	Increasing brightness
MEM	Focus memory pressed for < 2 sec: triggers positioning Pressed for > 2 sec: saves position	Zoom memory pressed for < 2 sec: triggers positioning Pressed for > 2 sec: saves position
PH/AUX	Camera release at the camera interface	Triggering an AUX signal at the AUX interface
XY-RES	XY recentering ("Reset")	XY recentering ("Reset")
AF	Triggering the autofocus option	

Roll-over procedure:

→ XY-RES → AF →
↑ ↓
← PH / AUX ← MEM ← LIGHT ←

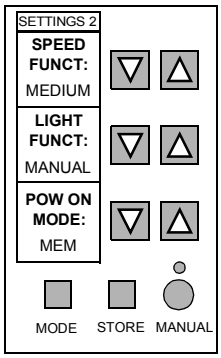
If the memory function (MEM) has been set for buttons (1) and (2) of the handgrips, you can determine whether a positioning run is triggered or whether the position is saved - simply by pressing the buttons for a longer or shorter time.
If you press button (1) for less than 2 seconds, focus positioning is triggered; if you press the button for more than 2 seconds, the current focus

position is saved.
If you press button (2) for less than 2 seconds, zoom positioning is triggered; if you press the button for more than 2 seconds, the current zoom position is saved.

Path: To return to the basic mode, press the MODE button in configuration mode 1 (SETTINGS 1), or do not press any button for 20 seconds.
To change to configuration mode 2 (SETTINGS 2), press the MODE and STORE buttons simultaneously.

Configuration mode 2 for OPMI Vario (SETTINGS 2)

Configuration mode 2



Configuration mode 2 for the OPMI Vario permits you:

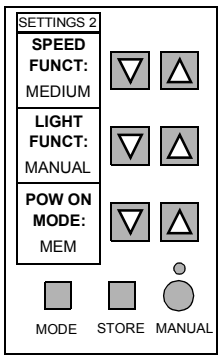
– to set the adjustment speeds of focus and X-Y coupling as a function of the zoom setting, menu item "SPEED FUNCT:"

– to set the lamp brightness as a function of the zoom setting, menu item "LIGHT FUNCT:"

– to define the power-on behavior of the system, menu item "POW ON MODE"

Path: The basic mode is automatically displayed after the instrument has been switched on.
To access configuration mode 2 from the basic mode, go via configuration mode 1.
For this, simultaneously press the "MODE" and "STORE" keys twice in succession:
1. Jump from the basic mode to configuration mode 1
2. Jump from configuration mode 1 to configuration mode 2.

Configuration mode 2



<u>Setting the adjustment speeds of focus and X-Y coupling as a function of the zoom setting (OPMI Vario)</u>

Menu item "SPEED FUNCT:" permits you to select dynamic speed control for the X-Y coupling and focus.

The depth of field of the optical system changes according to the zoom setting:

– The depth of field is large for a large field of view (small zoom value), and the focus needs to be adjusted over a large range for focusing the image. This means that the XY-coupling must be adjusted over a large range until the required position is reached. A high adjustment speed should therefore be used in this case.

– The depth of field is small for a small field of view (high zoom value), and the focus needs to be precisely adjusted in a small range for focusing the image. This means that the X-Y coupling must be precisely adjusted within a small range until the required position is reached. A low adjustment speed should therefore be used in this case.

It is therefore advisable to vary the adjustment speeds of the focus and X-Y coupling in accordance with the zoom setting.

The instrument has been factory-adjusted for MEDIUM variation of the adjustment speed as a function of the zoom setting. The best effect of dynamic speed control is achieved if an adjustment speed of <4.0 has been selected in the speed mode.

Note:
The dynamic speed control is based on the basic speed selected for focusing and the X-Y coupling in the speed mode.
If you have already set a high adjustment speed for focusing and the X-Y coupling in the speed mode, dynamic speed control may possibly not be effective across the entire zoom range, as the maximum adjustment speed is reached beforehand.

In the extreme case, if you have set the basic speed for focusing and the X-Y coupling to the maximum value of 10, dynamic speed control will have no effect at all.

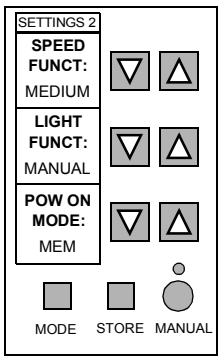
The upper display and key field (SPEED FUNCT:) in configuration mode 2 permits you to select high, medium or low speed adjustment, or none at all.

Roll-over procedure :

→ OFF → HIGH →
↑ ↓
← LOW ← MEDIUM ←

Setting the lamp brightness as a function of the zoom setting (OPMI Vario)

Configuration mode 2



Menu item "LIGHT FUNCT:" permits you to select dynamic control of the lamp brightness depending on the current zoom setting.

The lamp brightness you set in the basic mode is a fixed basic value of the illumination intensity. Configuration mode 2 (LIGHT FUNCT:) permits you to select automatic brightness control (AUTO) depending on the zoom setting. The automatic function ensures uniform brightness of the image over the full zoom range (0.4 to 2.4).

The transmission of the optical system decreases with increasing magnification from zoom value 1 onwards. This is compensated by the automatic function which increases the lamp brightness accordingly.

Use the middle display and key field (LIGHT FUNCT:) in configuration mode 2 to choose between automatically controlled or constant brightness of the lamp:

AUTO	MANUAL

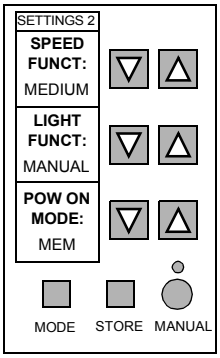
Warning!
Starting out from the basic brightness set in the basic mode, dynamic brightness control adjusts the lamp brightness to higher zoom values by increasing it up to the maximum. As a result, the tissue in the surgical field may be subjected to excessive radiation.
You will not be aware of this while looking through the surgical micro-

scope, as the image you see displays constant brightness throughout the zoom range. Only when looking directly at the surgical field will you notice that the brightness of the illumination varies, depending on the zoom setting.

Note:
If you have selected a relatively high basic brightness in the basic mode, the automatic function may not be able to sufficiently compensate for reduced transmission of the optical system.

Defining the power-on behavior of the system (OPMI Vario)
The "POW ON MODE" function permits you to define how the system should behave immediately after it has been switched on.

Configuration mode 2



You have the choice between the following power-on modes:

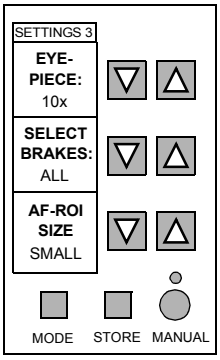
Display	Function
OFF	No positions are changed when you switch on the system. After power-on, you can use the appropriate buttons of the foot control panel or handgrips to **manually** set the focus and zoom to the user-defined values saved in the memory function.
PRESET	On power-on, the focus (working distance) and zoom are automatically set to the default factory settings: focus = 250 mm and zoom = 0.5. These two values are also saved in the memory function (FOC-MEM and ZOOM-MEM).
MEM	After power-on, the focus (working distance) and zoom are automatically set to the user-defined focus and zoom values saved in the memory function. The values in the memory functions FOC-MEM and ZOOM-MEM can be saved for specific users by pressing the STORE button.

Roll-over procedure:

→ MEM → OFF →
↑ ↓
← PRESET ←

Path: To return to the basic mode, press the MODE button in the configuration mode, or do not press any button for 20 seconds.
To change to configuration mode 3 (SETTINGS 3), press the MODE and STORE buttons simultaneously.

Configuration mode 3



Configuration mode 3 for OPMI Vario (SETTINGS 3)

Configuration mode 3 for the OPMI Vario permits you:

– to enter the eyepiece magnification for the calculation of the total magnification, menu item "EYE PIECE:"

– to select the magnetic brakes to be unlocked, menu item "SELECT BRAKES:"

– to select the ROI size, menu item "AF-ROI SIZE"
This menu item is only displayed if the autofocus option has been installed.

Path: Every time you switch on the system, the basic mode is automatically displayed.
To access configuration mode 3 from the basic mode, go via configuration modes 1 and 2 by simultaneously pressing the "MODE" and "STORE" buttons three times successively.

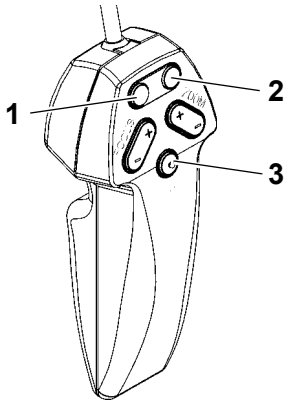
<u>Entering the eyepiece magnification for the calculation of the total magnification</u>

In the basic mode, you can display the total magnification (MAG) of the optical system as a factor in the middle display and key field. The total magnification is calculated by the software. For this purpose, the magnification of the eyepieces currently used must be known to the software.

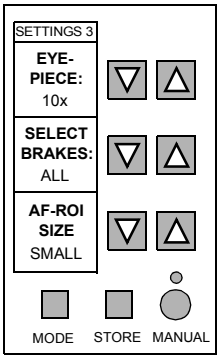
Use menu item "EYE PIECE:" to select one of the eyepiece magnifications available.

Roll-over procedure:

→ 16x → 10x →
↑ ↓
← 12,5x ←



Configuration mode 3



Selecting the magnetic brakes to be unlocked (OPMI Vario)

You can define which magnetic brakes should be unlocked when you press button B (3) of the left and/or right handgrip.

Menu item "SELECT BRAKES:" offers you the following options for selection:

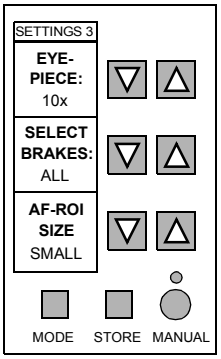
XY - Z	The magnetic brakes for X-Y movement and Z movement can be unlocked separately by pressing button B (3) on the left or right handgrip. • To release the magnetic brakes for X-Y movement only: press button B (3) on the left handgrip. • To release the magnetic brakes for Z movement only: press button B (3) on the right handgrip. • To release all magnetic brakes, i.e. the magnetic brakes of the suspension system (for X-Y and Z movements) and of the surgical microscope (for rotary and tilt movements): simultaneously press buttons B (3) on the left and right handgrip.
ALL	All magnetic brakes are always unlocked, i.e. the magnetic brakes of the suspension system (for X-Y and Z movements) and of the surgical microscope (for rotary and tilt movements), no matter whether you press button B (3) on the left or right handgrip.

Setting the ROI size

In an OPMI Vario equipped with the SpeedFokus (autofocus) option, the size of the ROI can be set using the menu item "AF-ROI SIZE".
Three different ROI sizes are available for selection:

– SMALL,
– MEDIUM
– LARGE

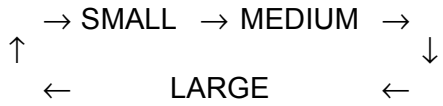
Configuration mode 3



The default setting for Standard User is the large ROI. You can change the size of the ROI, but the change cannot be saved for the Standard User. For specific users, the ROI size can be set and saved for each user as required.

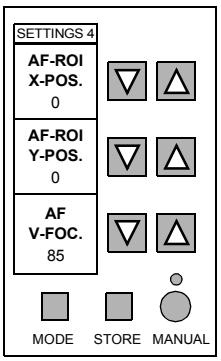
While you are setting the size of the ROI, the ROI is displayed as a square frame in the video image on the monitor. A few seconds after your last action, the frame disappears from the screen.

Roll-over procedure:



Path: To return to the basic mode, press the MODE button in the configuration mode, or do not press any button for 20 seconds.
To change to configuration mode 4 (SETTINGS 4), simultaneously press the MODE and STORE buttons in configuration mode 3.

Configuration mode 4



Configuration mode 4 for OPMI Vario (SETTINGS 4)

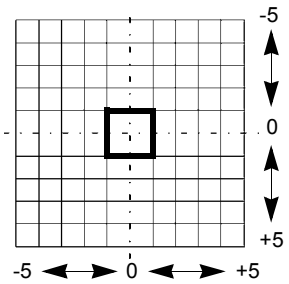
Configuration mode 4 for the OPMI Vario permits you:

– to define the horizontal and vertical ROI position, menu items "AF-ROI X-POS." and "AF-ROI Y-POS."

– to enter the video focal length, menu item "AF V-FOC"

Path: Every time you switch on the system, the basic mode is automatically displayed.
To access configuration mode 4 from the basic mode, go via configuration modes 1, 2 and 3 by simultaneously pressing the "MODE" and "STORE" buttons four times successively.

<u>Defining the position of the ROI</u>
The two menu items "AF - ROI X- POS." and "AF - ROI Y- POS." permit you to define the position of the ROI within the field of view of the microscope.



When you start your system, the ROI is always positioned at the center of the field of view. The ROI is visualized as a square in the graphic display. Starting from the center position in the field of view, the ROI can be moved in all directions by a maximum of 5 steps.

Use the arrow keys to shift the ROI:

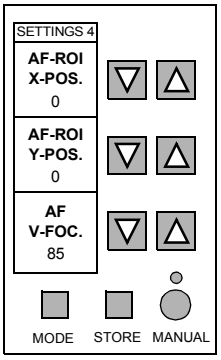
– to the left or right using menu item "AF-ROI X-Pos."

– up or down using menu item "AF-ROI Y-Pos."

<u>Entering the video focal length, menu item "AF-V-FOC"</u>

<u>Note:</u>
This setting is performed during the installation of the SpeedFokus (autofocus) option. It is a camera-specific setting which only needs to be changed when a different video camera is installed.

Configuration mode 4



The video focal length of the video camera currently used must be known to the SpeedFokus (autofocus) option. This menu item is used to specify this camera-specific value to the SpeedFokus (autofocus) option.
This setting must always conform to the technical specifications of the video camera used. The SpeedFokus (autofocus) option does not function properly if parameters have not been correctly set.

You can select the relevant focal length from the values offered.

Roll-over procedure:

→ 50 → 60 →
↑ ↓
← 105 ← 85 ←

Path: To return to the basic mode, press the MODE button in the configuration mode, or do not press any button for 20 seconds.
To change to configuration mode 5 (SETTINGS 5), simultaneously press the MODE and STORE buttons in configuration mode 4.

Configuration mode 5 for OPMI Vario (SETTINGS 5)

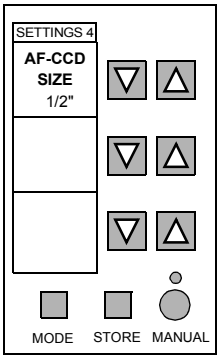
Menu item "AF-CCD SIZE" in configuration mode 5 for the OPMI Vario permits you to enter the size of the CCD array.

Path: Every time you switch on the system, the basic mode is automatically displayed.
To access configuration mode 5 from the basic mode, go via configuration modes 1, 2, 3 and 4 by simultaneously pressing the "MODE" and "STORE" buttons five times successively.

Entering the size of the CCD array, menu item "AF-CCD SIZE"

Note:
This setting is performed during the installation of the SpeedFokus (autofocus) option. It is a camera-specific setting which only needs to be changed when a different video camera is installed.

Configuration mode 5



The size of the CCD array (chip size) of the video camera currently used must be known to the SpeedFokus (autofocus) option. This menu item is used to specify this camera-specific value to the SpeedFokus (autofocus) option.
This setting must always conform to the technical specifications of the video camera used. The SpeedFokus (autofocus) option does not function properly if parameters have not been correctly set.

You can select the relevant size of the CCD array from the values offered.

Roll-over procedure:

→ 1/4" → 1/3" →
↑ ↓
← 1/2" ←

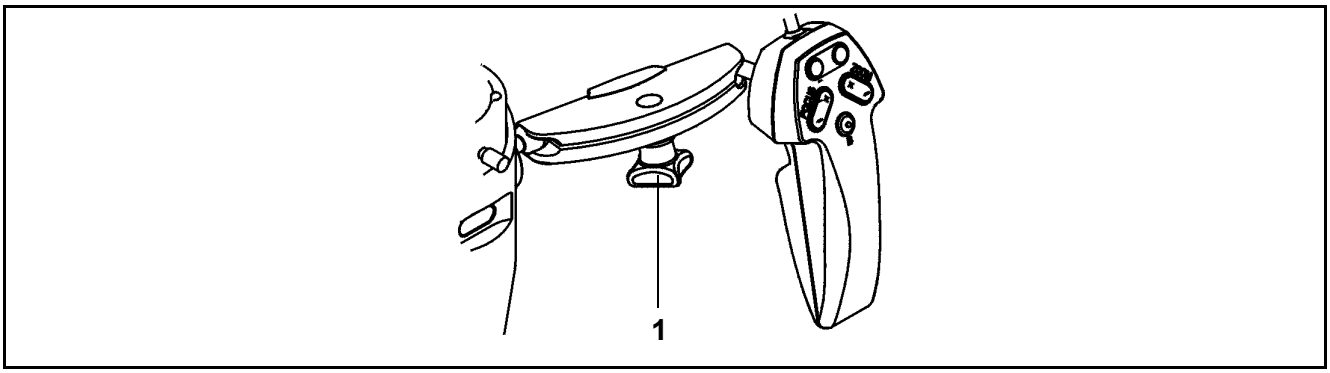
Path: To return to the basic mode, press the MODE button in the configuration mode, or do not press any button for 20 seconds.

Procedure

Warning!

– Avoid looking directly into the light source, e.g. into the microscope objective lens or light guide!

- Turn on the system at the power switch of the suspension system.
- Set the required brightness of the surgical field illumination on the suspension system.
- Check the system using the checklist.
- Swing the surgical microscope over the surgical field into an ergonomic position within the working distance.
- Press the actuator button on the X-Y coupling.
  - The X-Y coupling adopts its center position.
  - The focus adopts its initial position in the focusing range.
- Select the lowest magnification (zoom).
- For coarse focusing, look through the eyepieces and lower the surgical microscope until the surgical field comes into focus.
- Select the highest magnification (zoom).
- Look through the eyepieces and activate the focusing function until the image of the surgical field appears sharply focused.
- Select the magnification required (zoom). Look through the eyepieces of the binocular tube. Adjust the eyepieces in such a way that you can see both the edge of the field of view and the microscope image sharply.
- Bring the handgrips into a position convenient for the procedure planned and tighten locking screws (1).
- Switch the system off when not in use.


1

What to do in an emergency

Failure of a xenon lamp

Warning!
Lamp rupture (audible as a loud bang) may lead to jamming of the lamp module and/or failure of the electronics modules.

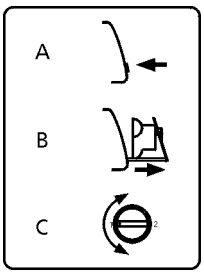
- Before opening the lamp housing, make sure that the system is moved to a position where neither the patient nor the user is put at risk by falling items.
- Do not continue using the system if the lamp module is jammed or the illumination is no longer operational due to defective electronics modules. Inform our service department.

Caution:
Do not cover the ventilation grid! For example, drapes could be covering the grid. This can lead to overheating of the lamp module and to lamp failure.

Note:
Yellow indicator lamp (5) lights when the lamp has failed. It goes out again after activation and ignition of the backup lamp.

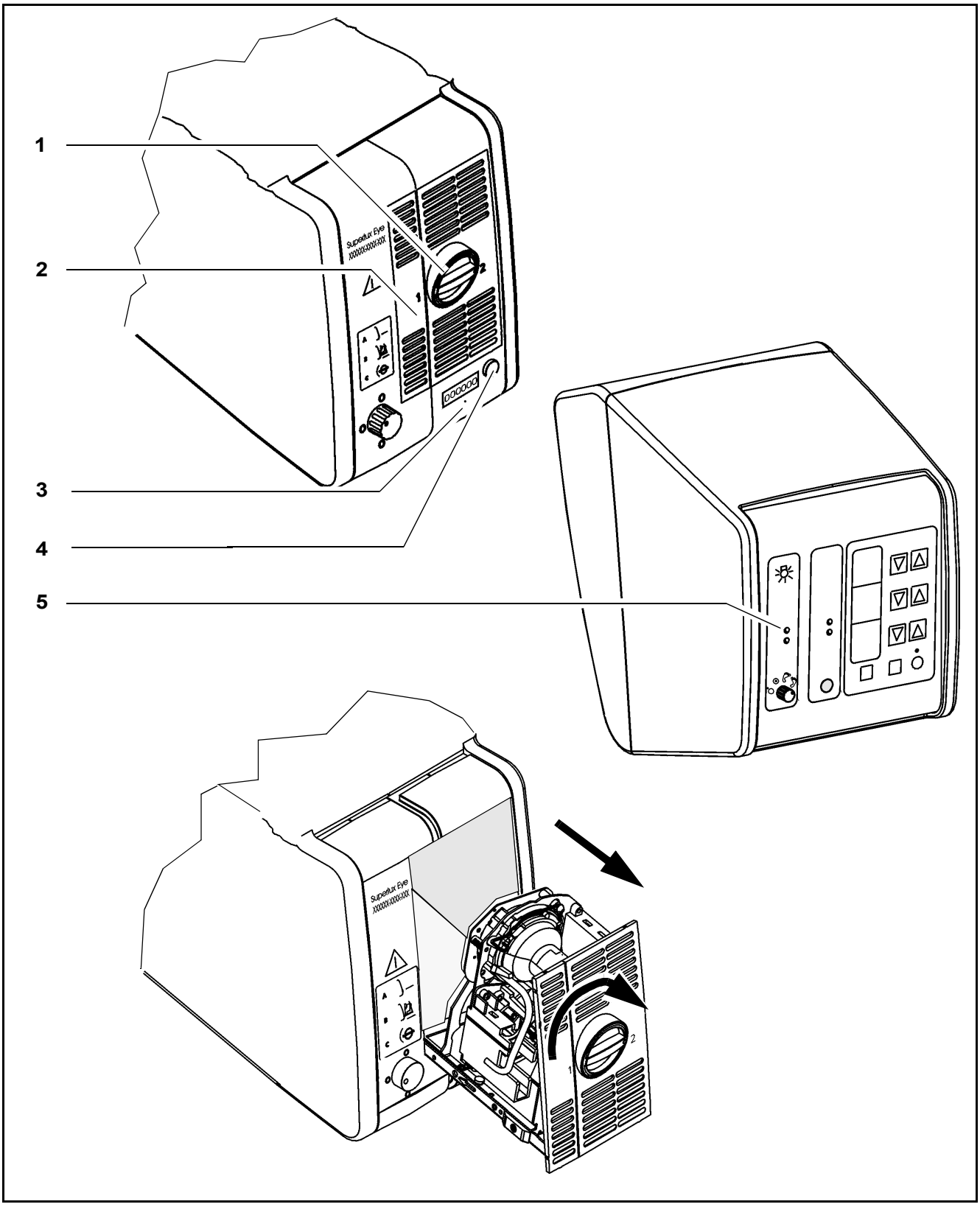
Switching to the backup lamp

- Turn off the suspension system at the power switch before switching to the backup lamp.



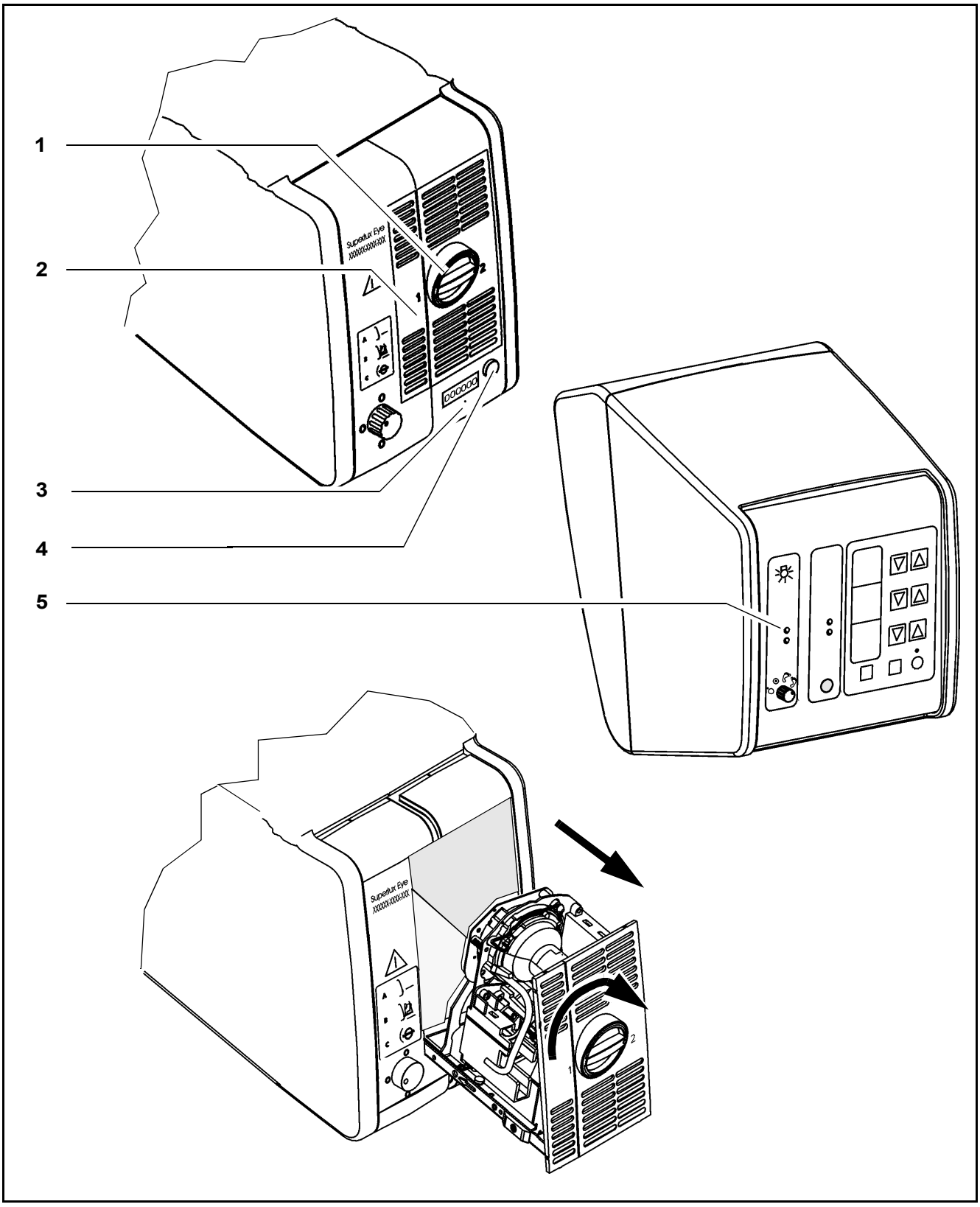
The lamp module contains two xenon lamps. The second lamp is used as a backup lamp which can be swung into the illumination beam path when the first lamp fails.
If the first xenon lamp fails, you can open lamp module (2) as follows:

- Press button (4). The lamp module is slightly ejected.


1
2
3
4
5

- Pull out the lamp module as far as it will go.
- Turn knob (1) through 180° until it snaps in. This swings the second xenon lamp (backup lamp) into the beam path.
- Push the lamp module all the way back into the lamp housing.
- Reset the service hour counter to "0". Use a pointed object and press it into the recess of reset button (3).
- Turn the suspension system back on at the power switch.

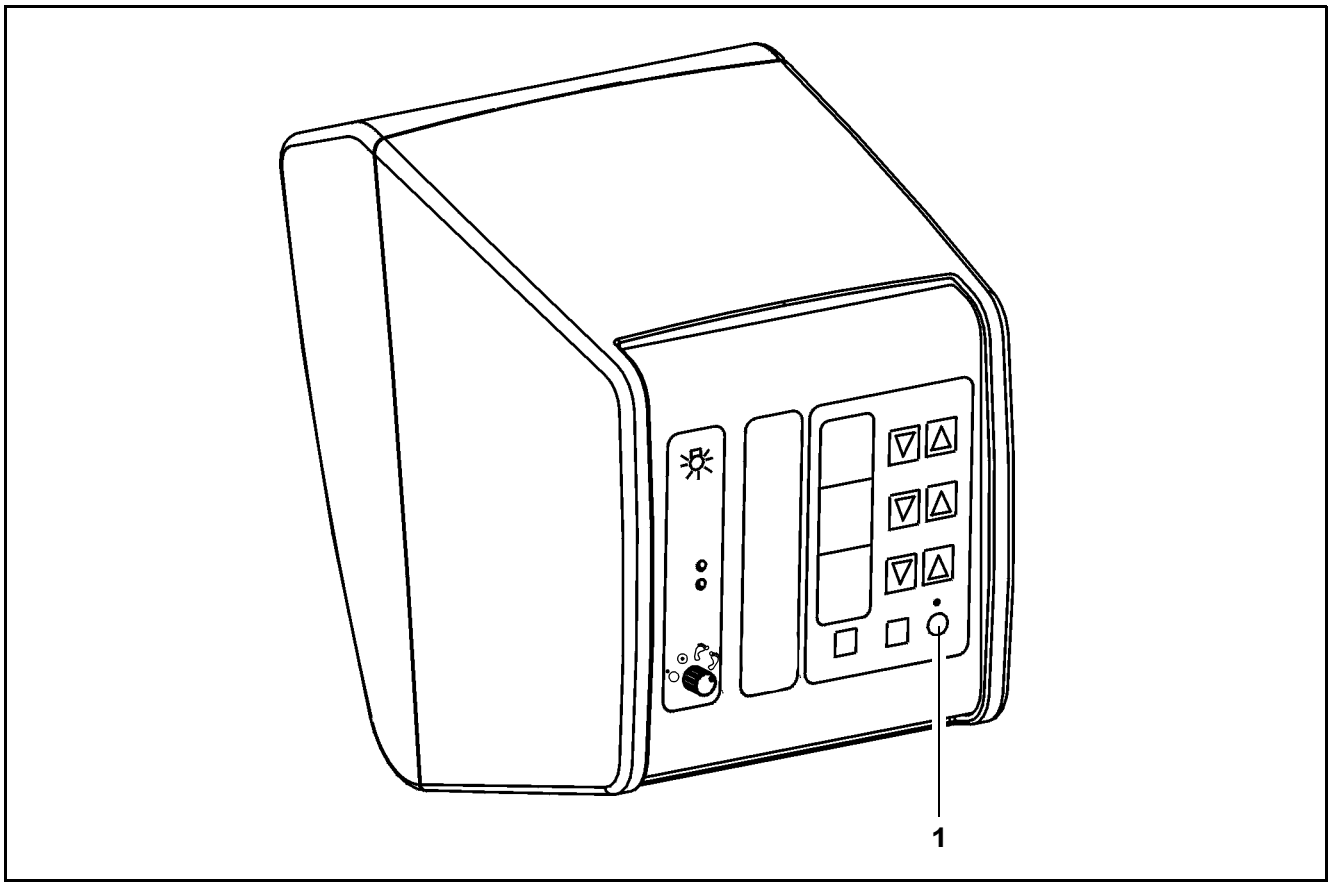
Note:
If the first lamp has failed and the backup lamp is in use (red segment in knob (1) lights up), make sure to have a backup lamp module ready at hand as a precaution.


1
2
3
4
5

Failure of lamp control

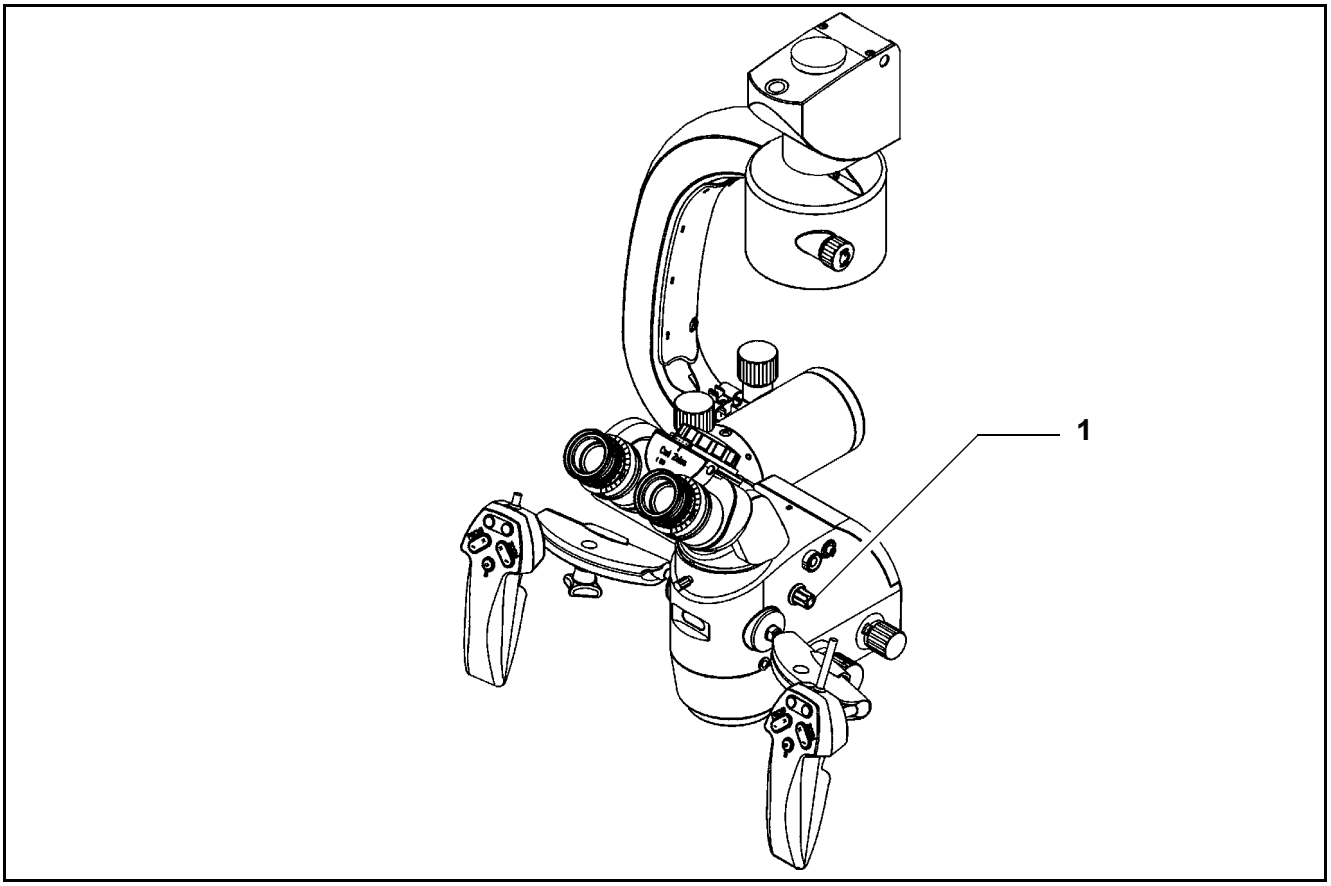
- Press Manual button (1) if brightness control is no longer possible.

Note:
When the manual function has been activated, all electrical control systems are inoperative. The lamp brightness is automatically adjusted to a fixed setting.



Failure of the zoom function

- Adjust the magnification manually using zoom knob (1).
- If the zoom drive moves into an end position, press the "MANUAL" button on the control panel of your suspension system. The "MANUAL" key permits you to switch to manual operation. The motorized functions of the surgical microscope are deactivated.
  - Continue surgery by manually operating the suspension system and the surgical microscope.

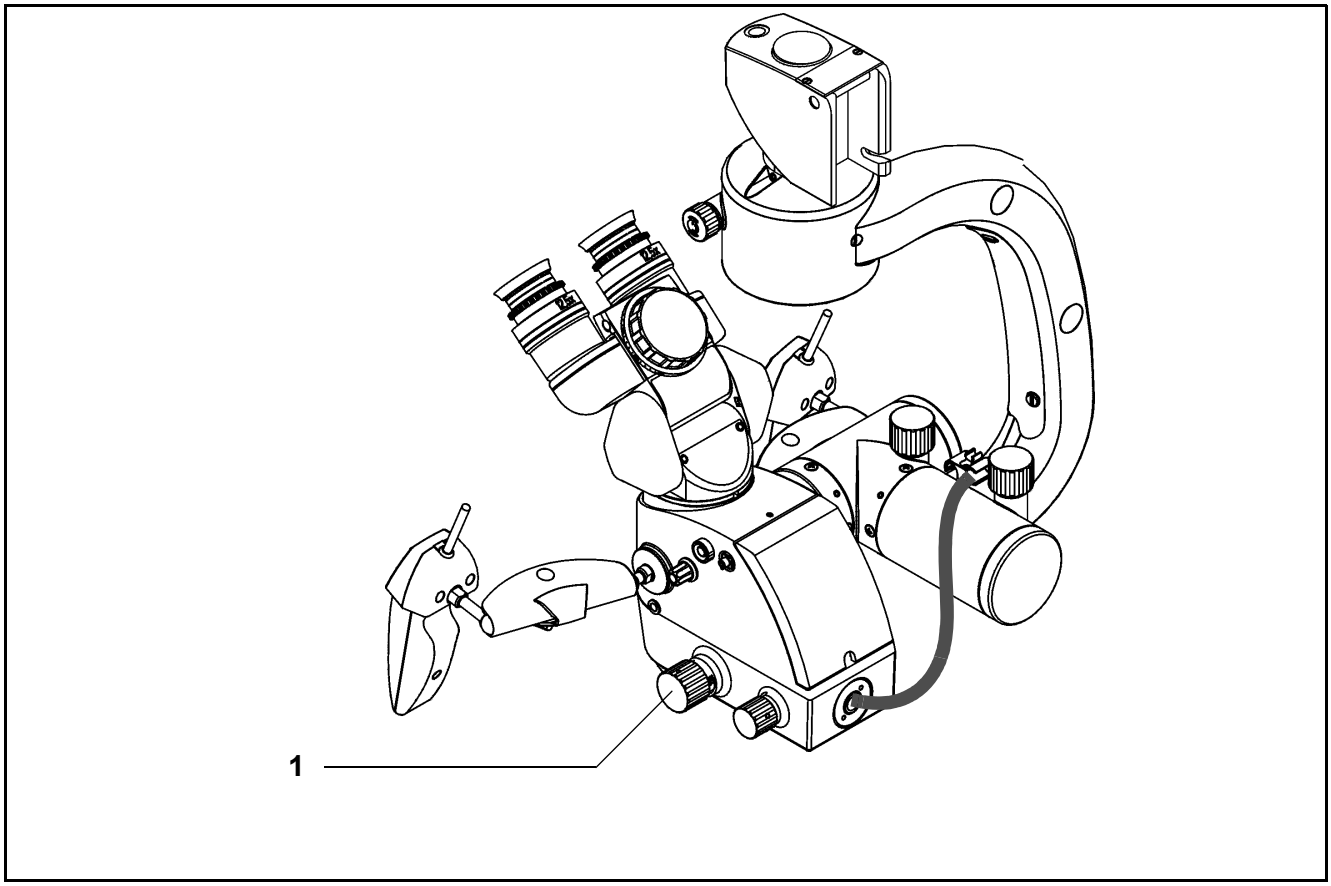


Failure of the focusing function

- Adjust the focus manually using focusing knob (1).
- If the focus drive moves into an end position, press the "MANUAL" button on the control panel of your suspension system. The "MANUAL" key permits you to switch to manual operation. The motorized functions of the surgical microscope are deactivated.
  - Continue surgery by manually operating the suspension system and the surgical microscope.

  or

  - Manually focus the surgical microscope by moving the suspension arm or using the lifting column of the suspension system.



Failure of magnetic brakes

In the event of a failure of the magnetic brakes (magnetic brakes do not unlock), you can position the microscope manually by overcoming the locking effect of the magnetic brakes.

Maintenance / Further information

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Trouble-shooting

- This instrument is a high-grade technological product. To ensure optimum performance and safe working order of the instrument, its safety must be checked once every 12 months. We recommend having this check performed by our service representative as part of regular maintenance work.
  If a failure occurs which you cannot correct using the trouble-shooting table, attach a sign to the instrument stating it is out of order and contact our service representative.

OPMI® Vario surgical microscope

Problem	Possible cause	Remedy	See
No function at all.	Suspension system switched off.	Switch on the suspension system.	–
	Line power failure.	Contact in-house electrician.	–
Surgical field illumination inoperative.	Illumination system of suspension system switched off.	Switch on illumination system of suspension system. See user's manual for suspension system.	–
	Defective lamp.	Change the lamp. See user's manual for suspension system.	
	Light guide not properly inserted in lamp or microscope.	Insert light guide as far as it will go.	page 134
	Lamp module in suspension system has no contact.	Insert lamp module as far as it will go.	–
	Failure of electronics.	Illuminate surgical field using an OR illuminator. Contact service dept.	–

Problem	Possible cause	Remedy	See
Insufficient surgical field illumination.	Brightness level set too low.	Adjust brightness using the brightness control on the illumination system. See user's manual for suspension system.	–
	Light guide not properly inserted in lamp and/or microscope.	Insert light guide as far as it will go.	page 134
	Defective light guide (illumination not uniform).	Contact service dept.	–
Zoom system inoperative.	Defective motor.	Adjust magnification manually using the zoom knob. Contact service dept.	page 56
	Zoom system always moves to upper or lower end position.	Switch suspension system to MANUAL mode. Adjust magnification manually using the zoom knob. Contact service dept.	page 56
Focusing system inoperative.	Focus stop button pressed.	Press the focus stop button again. The button must not be lit.	page 56
	Defective motor.	Adjust the working distance manually using the focusing knob. Contact service dept.	page 56
	Focusing system always moves to upper or lower end position.	Switch suspension system to MANUAL mode. Adjust the working distance manually using the focusing knob. Contact service dept.	page 56

OPMI® Vario surgical microscope on suspension system

Problem	Possible cause	Remedy	See
Total magnification is incorrectly displayed.	Eyepiece magnification has not been correctly entered.	Enter current eyepiece magnification at EYEPIECE in configuration menu 3.	

Problem	Possible cause	Remedy	See
Zoom and focus are not set to stored memory values after power-on of the system.	Power-on mode not correctly selected.	Select the desired power-on behavior at POW ON MODE in configuration mode 2.	
Lamp brightness changes with magnification.	No error! Dynamic brightness control has been activated.	Select the mode required at LIGHT FUNCT in configuration mode 2.	

SpeedFokus (autofocus) option

Problem	Possible cause	Remedy	See
SpeedFokus (autofocus) option is inoperative.	Camera control unit (CCU) switched off. Error code display: E20	• Switch on MediLive CCU.	- - -
	Monitor switched off.	• Switch on the monitor.	- - -
	Failure of SpeedFokus (autofocus) option	• Contact service dept.	- - -
Poor focusing result or none at all.	Focusing of the video camera not matched to focusing of the surgical microscope.	• Focus the microscope image, then the video image.	- - -
	Measuring field (ROI) incorrectly positioned.	• Correct the ROI position in configuration mode 4.	page 192
	Suspension system moved during focusing.	• Do not move suspension system during focusing.	- - -
	No object in focusing range.	• Reposition surgical microscope.	- - -
	No object with sufficient contrast in focusing range.	• Reposition surgical microscope or focus manually.	- - -

Problem	Possible cause	Remedy	See
Poor focusing result or none at all.	Incorrect entry for camera orientation (left/right), menu item "AF-CCD Position".	• Activate the Video-AF mode and change the video camera orientation.	page 182
	Incorrect entry for the video focal length in menu item "AF-V-FOC.".	• Activate configuration mode 4 and enter the correct focal length.	page 192
	Video camera not correctly oriented.	• Turn video camera so that the video image corresponds to main observer's viewing direction.	- - -
Focused video image on monitor, but unfocused image in surgical microscope.	Setting of diopter rings on eyepieces has been changed.	• Set diopter rings to zero or to the correct value.	- - -
Focused image in surgical microscope, but unfocused video image on monitor.	Focusing of video camera has not been matched to focusing of surgical microscope.	• Focus the microscope image, then the video image.	- - -
Focusing cannot be activated.	Different function assigned to handgrip button 1 or 2.	• Activate configuration mode 1 and assign the AF (Autofocus) function to handgrip button 1 or 2.	page 184
	Different function assigned to button C or D of foot control panel (on foot control panel with 8 or 14 functions).	• Activate configuration mode 1 and assign the AF (Autofocus) function to foot control panel button C or D.	page 183

Suspension systems

Problem	Possible cause	Remedy	See
No function at all.	Line power failure.	Contact in-house electrician.	-
	Power switch of suspension system not switched on.	Press power switch.	-
	Automatic circuit breaker in power switch of suspension system has been activated.	Press power switch again.	-
Surgical field illumination on microscope not working.	Thermal cut-out activated.	Remove the cause of overheating. For example, drapes could be covering the grid. When the lamp module has cooled down, the illumination switches on again.	-
	Selector set in such a way that illumination can be switched on using foot control panel.	Switch on illumination using foot control panel (button A or B).	-
	Failure of suspension system electronics.	Illuminate surgical field using an OR illuminator. Contact service dept.	-
Yellow indicator lamp in display field blinks.	Defective main and backup lamps.	Change lamp or insert backup lamp module.	-
	Defective lamp module.	Illuminate surgical field using an OR illuminator. Contact service dept.	-
Surgical field illumination too bright.	Brightness level set too high.	Adjust brightness using control on suspension system or foot control panel.	page 153
		Switch off illumination on suspension system. Illuminate surgical field using an OR illuminator. Contact service dept.	-
Lamp brightness cannot be adjusted.	Manual function is activated. (Yellow LED above the button is lit).	Switch off manual function.	-

Problem	Possible cause	Remedy	See
Motorized focusing and zoom functions of surgical microscope are inoperative.	Manual function is activated. (Yellow LED above the button is lit).	Switch off manual function.	-
Suspension arm is in horizontal position and cannot be moved upwards or downwards.	Suspension arm still locked.	Pull out locking device and turn though 180°.	-
 XXX In combination with three successive beeps and display of the error code (XXX).	– Error message during the software check after power-on of the suspension system. – Error message for an internal system error.	Manual operation is possible. Contact service dept., specify error code and serial no.	-
S88 floor stand only: stand wobbles.	Floor not level. Stand base not appropriately positioned.	Slightly turn stand base. Articulated arm should be positioned at a right angle with tilt axis.	

Xenon illumination system

Problem	Possible cause	Remedy	See
Surgical field illumination on microscope not working.	Thermal cut-out activated.	Remove the cause of overheating. For example, drapes could be covering the grid. When the lamp module has cooled down, the illumination switches on again.	-
	Selector is set in such a way that illumination can be switched on using the foot control panel.	Switch on illumination using the foot control panel (button A or B).	-
	Defective xenon lamp.	Switch to backup lamp.	-
		Keep a new xenon backup lamp module ready at hand.	-
	Xenon lamp module has no contact.	Insert xenon lamp module as far as it will go.	-
	Failure of suspension system electronics.	Illuminate surgical field using an OR illuminator. Contact service dept.	-
Insufficient surgical field illumination.	Brightness level set too low.	Adjust brightness on the suspension system's display field or using the foot control panel.	Page 50
	Aged xenon lamp.	Switch off illumination on suspension system. Illuminate surgical field using an OR illuminator.	
		Change xenon lamp module.	page 214
Surgical field illumination too bright.	Brightness level set too high.	Adjust brightness using the control on the suspension system or the foot control panel.	Page 50
		Switch off illumination on suspension system. Illuminate surgical field using an OR illuminator. Contact service dept.	-

Problem	Possible cause	Remedy	See
No surgical field illumination.	Xenon lamp does not ignite.	Switch off illumination on suspension system. Illuminate surgical field using an OR illuminator. Contact service dept.	--
Xenon lamp is lit, but beep sounds intermittently.	Defective lamp control system.	Switch off illumination on suspension system. Illuminate surgical field using an OR illuminator. Contact service dept.	--

Video monitor

Problem	Possible cause	Remedy	See
No imge display.	Main switch is switched off.	Switch on the main switch.	-
	Power cable not correctly plugged in.	Plug in the power cable.	-
Displayed message "NO SIGNAL"	No signal source connected.	Connect a signal source.	-
	No camera connected.	Connect a camera.	-
	Connected video cable is defective.	Connect an intact video cable.	-
Image is not centered.	A signal source is present on the VGA port, and no automatic image adjustment has been performed.	Perform automatic image adjustment.	page 88
Image is too dark or too bright.	A signal source is present on the VGA port, and no automatic image adjustment has been performed.	Perform automatic image adjustment.	page 88

Changing the xenon lamp module

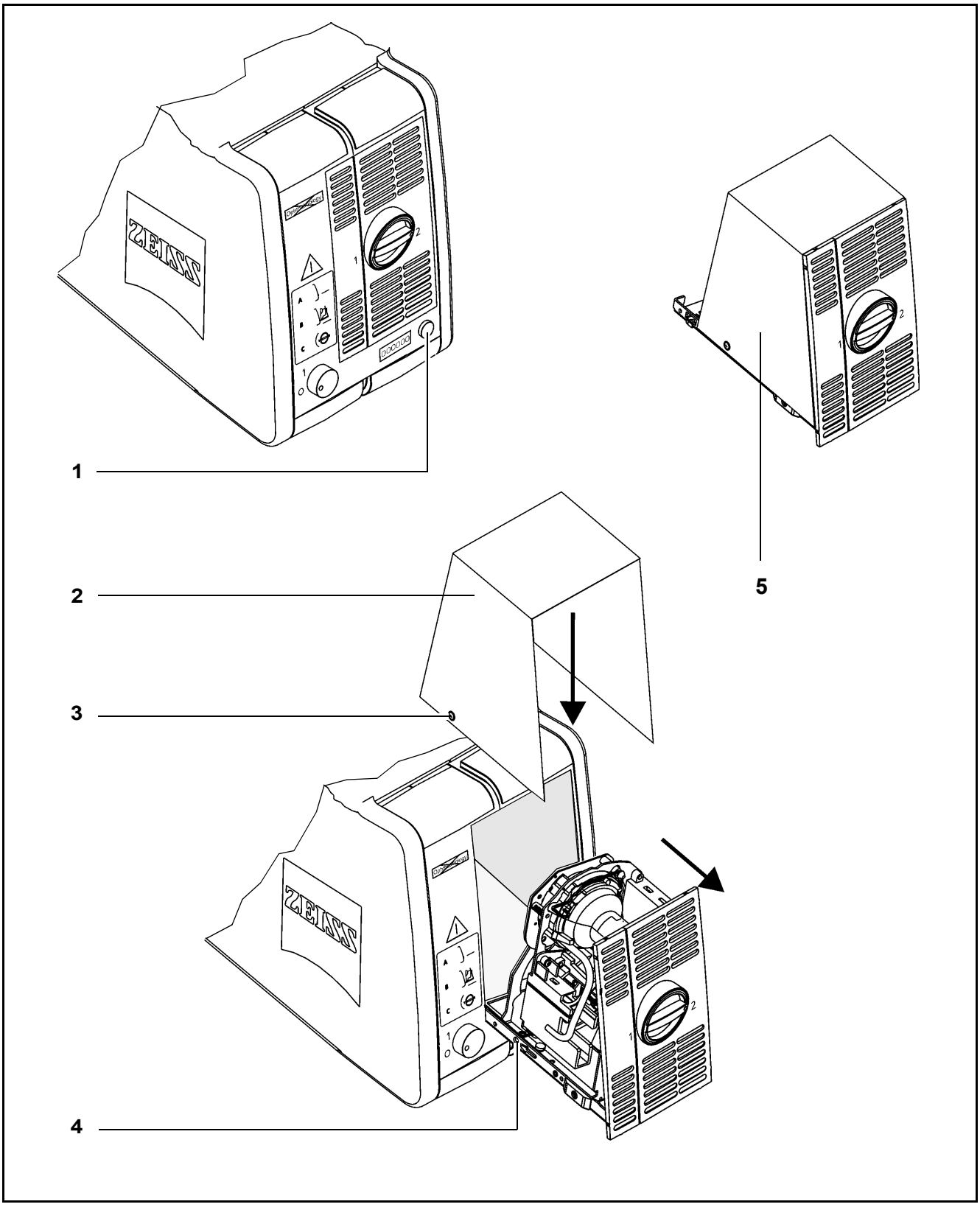
Warning!
The lamp module must only be changed by appropriately trained personnel. Improper handling of the xenon lamp may lead to damage or injury.

Warning!
Lamp rupture (audible as a loud bang) may lead to jamming of the lamp module and/or failure of the electronics modules.

- Before opening the lamp housing, make sure that the system is moved to a position where neither the patient nor the user is put at risk by falling items.
- Do not continue using the system if the lamp module is jammed or the illumination is no longer operational due to defective electronics modules. Inform our service department.

Change the lamp module as follows:

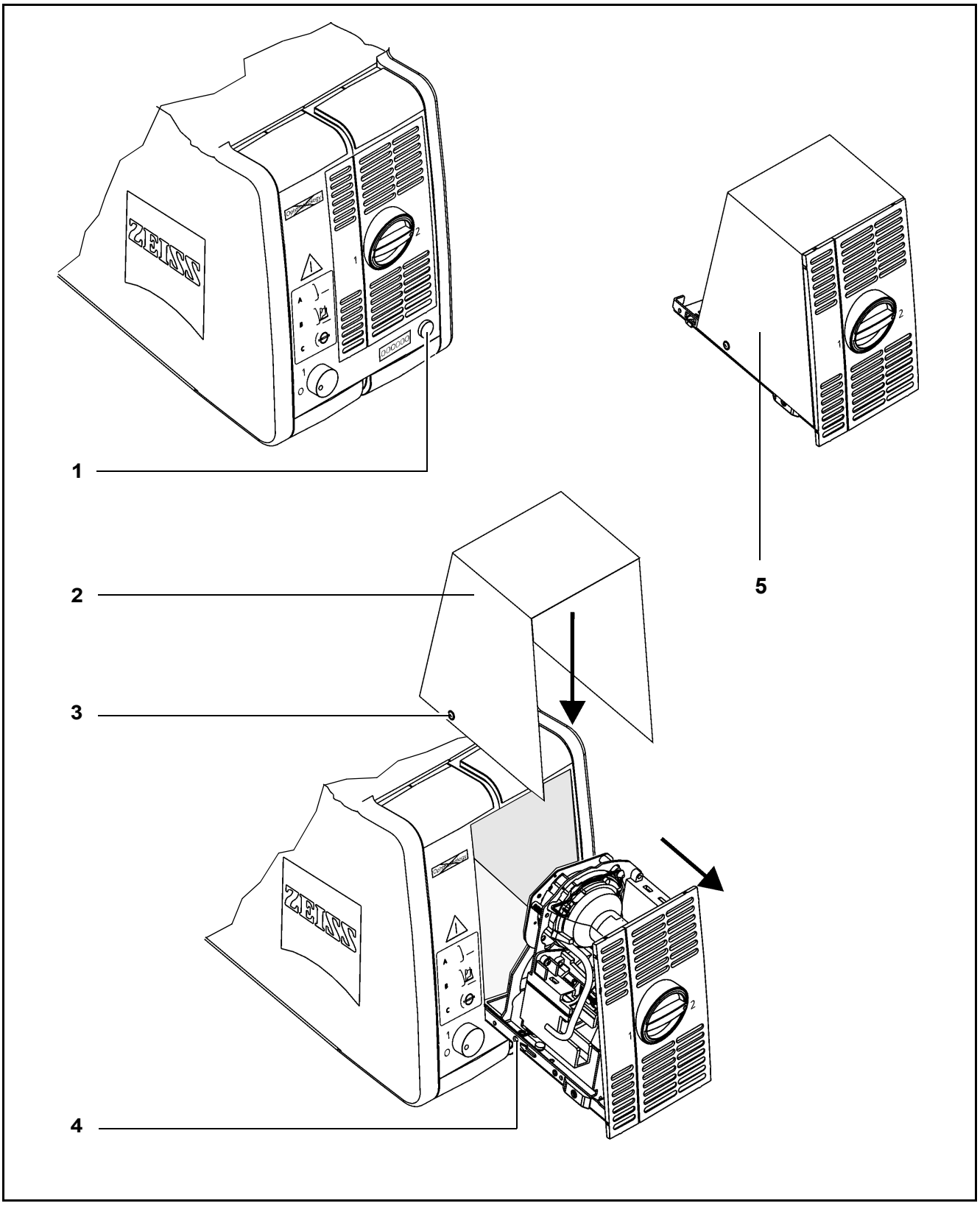
- First switch off the suspension system at the power switch.
- Only change the lamp module after it has cooled down completely! In the event of a malfunction, there is a risk of explosion due to the high pressure inside the hot lamp. The hot surface of the xenon lamp may also cause burns.
- Only change the module after switching off the system. The igniter produces high voltage when the system is on.
- Press button (1). The lamp module is slightly ejected.
- Pull out the lamp module as far as it will go.
- Slide the original transport case (2) over the module, making sure that bolt (3) engages in bore (4). This unlocks the stop.
- Remove the old module and install the new lamp module by proceeding in the reverse order.
- Check the function of the xenon lamp and backup xenon lamp.


1
2
3
4
5

Pack the old lamp module (5) in the transport package of the new lamp module. Fill in the enclosed return card and send the old lamp module to the nearest Carl Zeiss service agency.

Note:

- Only use the original transport case (2) as it also provides explosion protection, should xenon lamps be defective.


1
2
3
4
5

Adjusting the monitor arm

If the TFT monitor does not remain in place in the required position, you can increase the resistance of the following components:

Resistance on the carrier arm (left/right)

- Slightly tighten screw (1) of the carrier arm by turning it clockwise using an M5 hex key.

Resistance on the suspension arm (left/right)

- Remove plastic cover (2) on the suspension arm joint.
- Loosen screw (4) on the carrier arm by turning it counterclockwise using an M2.5 hex key.
- Tighten adjustment screw (3) of the suspension arm by turning it clockwise until the required friction has been obtained.
- Firmly retighten screw (4) on the carrier arm by turning it clockwise using an M2.5 hex key.
- Reattach plastic cover (2).

Resistance on the gas pressure spring (upward/downward)

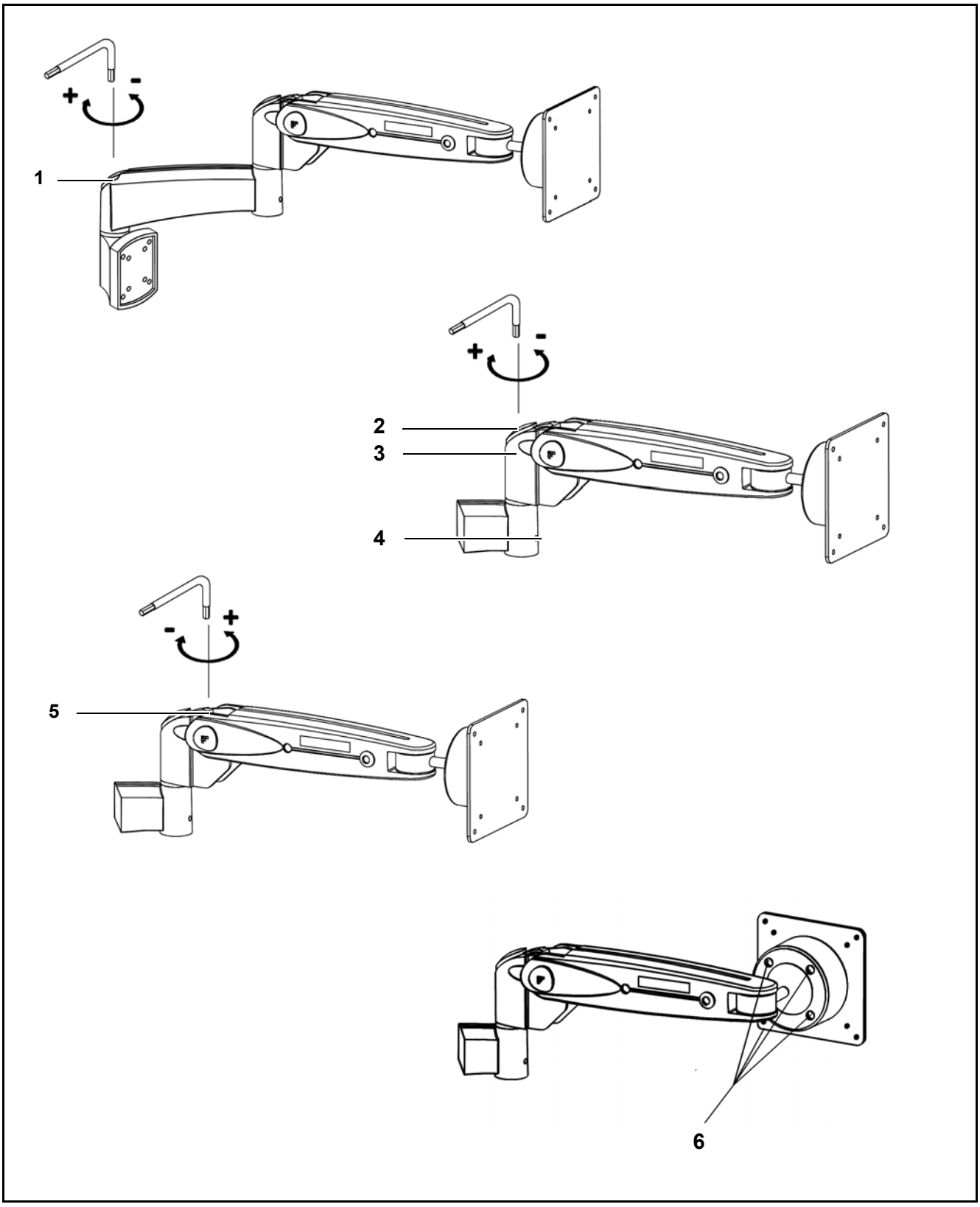
- For correct adjustment of the gas pressure spring, align the carrier and suspension arms in a horizontal position.
- Tighten setting screw of the gas pressure spring (5) by turning it **counterclockwise** with an M5 hex key until the suspension arm with the TFT monitor no longer moves downward by itself.

Note:
If the suspension arm with the TFT monitor continues to move downward, the gas pressure spring is defective. Notify our service representative.

Resistance on the ball joint

- Tighten all of the four securing screws (6) of the ball joint by turning them clockwise until the TFT monitor remains in the required position.

Note:
After adjustment, please check whether the TFT monitor remains in the required position.


1
2
3
4
5
6

Magnifications / Fields of view

If the magnification factor γ of the zoom system is known, you can calculate the total magnification of the surgical microscope. The following equation is used to determine the total magnification:

$$M_T = \frac{f_{tube}}{f_{obj}} \cdot \gamma \cdot M_{eye}$$

Where:

f_{tube} is the focal length of the binocular tube

f_{obj} is the focal length of the main objective lens (does not correspond to working distance!)

γ is the magnification factor of the zoom system

M_{eye} is the magnification of the eyepiece

Example:

f_{tube}= 170 mm, f_{obj} = 300 mm, γ = 1.6 and M_{eye} = 12.5 x.

The resulting total magnification is:

$$M_T = \frac{170\ mm}{300 mm} \cdot 1.6 \cdot 12.5 = 11.3$$

If the total magnification of the surgical microscope M_T is known, you can use the formula

$$FoV_D = \frac{FoVN \cdot M_{eye}}{M_T}$$

to calculate the field of view diameter FoV_D of the surgical microscope. The field of view diameter is the diameter of the circular surgical field which can be seen through the eyepieces.
FoVN in the above formula stands for the field of view number of the eyepiece.

By entering the value MT = 11.3 in the formula, we obtain the following field of view diameter for 12.5x eyepieces with a field of view number FoVN of 18 mm:

$$FoV_D = \frac{18\ mm \cdot 12.5}{11.3} = 19.9\ mm$$

Notes:

– Field of view numbers:
  10x widefield eyepiece: FoVN 21
  12.5x widefield eyepiece:FoVN 18

– With the Varioskop objective lens integrated in the OPMI Vario, there is a considerable difference between the working distance displayed and the focal length of the Varioskop objective lens. See table page 237.

– If the OPMI Vario is installed on the S8 suspension system, the suspension system´s LCD shows the total magnification of the microscope.

Care of the unit

Warning!
If possible, the systems and accessories should be cleaned immediately after use. Contaminations should not be allowed to dry on the objects, as this would make cleaning and disinfecting more difficult.
If possible, machines should be used for disinfecting and cleaning. For details, please also see the relevant notes on sterilization equipment.

Cleaning optical surfaces

The multi-layer T* coating of the optical components (e.g. eyepieces, objective lenses) ensures optimum image quality.
Image quality is impaired by even slight contamination. To protect the internal optics from dust, the system should never be left without the objective lens, binocular tube and eyepieces. After use, cover the system to protect it from dust. Always store optical components and accessories in dust-free cases when they are not being used.

Clean the external surfaces of optical components as required:

Caution:
Do not use any chemical detergents or aggressive substances. These may damage the optical surfaces.

- Remove coarse dirt (splashes of blood etc.) using distilled water to which a dash of household dish-washing liquid has been added. Wipe the surfaces only with a damp, under no circumstances with a wet cloth.
  Any remaining marks can be easily removed using the following aids.
- For thorough cleaning of optical surfaces, use the optics cleaning set (Cat. No. 1216-071) or damp optics cleaning wipes (available from specialized dealers).
- Remove minor contaminations such as dust, streaks, etc. using a clean microfiber cleaning cloth (available from specialized dealers or under Cat.No. 1254-655).

Auxiliaries from Zeiss: **optics cleaning set, Cat. No. 1216-071**

Suitable for the cleaning of objective lenses and eyepieces of the surgical microscope at regular intervals.

Fogging of optical surfaces

To protect the eyepiece optics from fogging, we recommend using an anti-fogging agent.

Note:
Anti-fogging agents provided by eyecare professionals for use with eyeglass lenses are also suitable for Zeiss eyepieces.

- Please observe the instructions for use supplied with each anti-fogging agent.

Anti-fogging agents do not only ensure fog-free optics. They also clean the eyepiece optics and protect them against dirt, grease, dust, fluff and fingerprints.

Cleaning mechanical surfaces

All mechanical surfaces of the equipment can be cleaned by wiping with a moist cloth. Do not use any aggressive or abrasive cleaning agents.

Wipe off any residue with a mixture of 50% ethyl alcohol and 50% distilled water plus a dash of household dish-washing liquid.

Sterilization

The asepsis sets available from Carl Zeiss contain rubber caps, sleeves and handgrips which can be sterilized in autoclaves. We recommend the following program for sterilization:

Sterilization temperature:	134° C
Sterilization time:	10 minutes

Sterile single-use drapes are available to cover the system.

Note:
When draping the system, make sure there is enough slack in the drapes to allow for movement of the microscope carrier and surgical microscope. It is especially important that the drapes are completely loose around the handgrips. The surgeon must be able to operate the controls through the drape.

Disinfecting the control keys

To be able to use the system in the OR, for example, it may be necessary to disinfect the control keys. We recommend using MELISEPTOL disinfectant solution (B. Braun, Melsungen AG). Carl Zeiss keeps MELISEPTOL in stock, and you can also obtain it locally in many countries from representatives of B. Braun, Melsungen AG.

Warning!

– Wear disposable plastic gloves to prevent skin contact with the disinfectant.

– MELISEPTOL is inflammable (flame point at 31 °C). Please read the product information from B. Braun, Melsungen AG.

To apply MELISEPTOL, proceed as follows:

- Switch off the unit before disinfecting.
- Apply the disinfectant across the entire surface of the control panel. Do not let any disinfectant seep into the unit.
- Leave the disinfectant on the unit for approx. 30 minutes.
- Then carefully wipe the disinfectant off the surface using a sterile, lint-free cloth.
- Dispose of the gloves and cloth as normal waste.

You can obtain the following articles from Carl Zeiss:

	Cat. No.
1 l MELISEPTOL in vario bottle	000000-0103-907
MELISEPTOL HBV spray, 250 ml	000000-0103-910
MELISEPTOL HBV cloths	000000-0103-911
Disposable gloves:	
Size 1 (large) size 8-9	000000-0117-736
Size 2 (medium) size 7-8	000000-0117-737

Asepsis

Description	Qty	Cat. No.
VisionGuard replacement lenses	20	306001-0000-000
VisionGuard lens protector	10	306002-0000-000
Drape, long version	5 x	306071-0000-000
Drape, short version	5 x	306070-0000-000
Sterile sleeves for handgrips	20 x	326088-0000-000
Sterilizable rubber caps for control knobs on OPMI:		
Zoom (12 mm)	6 x	305810-9002-000
Spot illumination (22 mm)	6 x	305810-9001-000
Focus (27 mm)	10 x	305810-9008-000
Sterilizable rubber caps for control knobs on support arm:		
Balance setting knob, front-to-back tilt (27 mm)	10 x	305810-9008-000
Balance setting knob, lateral tilt (27 mm)	10 x	305810-9008-000
Friction adjustment knob, microscope rotation (22 mm)	6 x	305810-9001-000
Asepsis cap for PD adjustment on 180° tiltable tube	6 x	305810-9003-000
Sterilizable rubber cap for 45° tiltable tube	6 x	305810-9001-000

Ordering data

OPMI Vario surgical microscope

Description	Weight [kg]	Cat. No.
OPMI Vario surgical microscope and suspension system	8.70	1026-700
S8 coupling for OPMI without shaft: Vario	0.80	1026-772
S light guide, 2.5m, with 90° adapter		303481-9225
Dust cover, blue with Zeiss logo		1055-278
Tiltable binocular tube, f=170 mm, 180°	0.89	303791- 0000
12.5x push-in widefield eyepieces, asph. (2x)	0.14	305543- 0000

S88 floor stand

Description	Cat. No.
S88 floor stand	305952-9940-000
Coupling for VARIO	000000-1026-772
Xenon illumination system	000000-1174-212
S light guide, 2.5 m	303481-9225-000
Replacement lamp module complete with 2 xenon bulbs in transport container and with return card; in exchange for a returned module with defective xenon bulbs	304977-9036-700
Xenon lamp module complete with 2 xenon bulbs (new component)	304977-9036-000
Foot control panel 2 with 14 functions, 3 m cable	304979-9030-000
Foot control panel 2 with 14 functions, 3 m cable	304979-9035-000

S88 floor stand with lifting column

Description	Cat. No.
S88 floor stand with lifting column	305952-9950-000
Coupling for VARIO	000000-1026-772
Xenon illumination system	000000-1174-212
S light guide, 2.5 m	303481-9225-000
Replacement lamp module complete with 2 xenon bulbs in transport container and with return card; in exchange for a returned module with defective xenon bulbs	304977-9036-700
Xenon lamp module complete with 2 xenon bulbs (new component)	304977-9036-000
Foot control panel 2 with 14 functions, 3m cable, longitudinal orientation of focus and zoom	304979-9030-000
Foot control panel 2 with 14 functions, 3m cable, transverse orientation of focus and zoom	304979-9035-000

S8 ceiling mount

Description	Cat. No.
S8 ceiling mount	000000-1176-968
Coupling for VARIO	000000-1026-772
Xenon illumination system	000000-1174-212
S light guide, 2.5 m	303481-9225-000
Replacement lamp module complete with 2 xenon bulbs in transport container and with return card; in exchange for a returned module with defective xenon bulbs	304977-9036-700
Xenon lamp module complete with 2 xenon bulbs (new component)	304977-9036-000
Foot control panel 2 with 14 functions, 6 m cable, longitudinal orientation of focus and zoom	304979- 9050-000
Foot control panel 2 with 14 functions, 6m cable	304979-9055-000

S81 ceiling mount

Description	Cat. No.
S81 ceiling mount	000000-1176-969
Coupling for VARIO	000000-1026-772
Xenon illumination system	000000-1174-212
S light guide, 2.5 m	303481-9225-000
Complete replacement lamp module with 2 xenon lamps in transport container and with return card; in exchange for a returned module with defective xenon lamps	304977-9036-700
Complete xenon lamp module with 2 xenon lamps (new component)	304977-9036-000
Foot control panel 2 with 14 functions, 6m cable	304979-9050-000
Foot control panel 2 with 14 functions, 6m cable	304979-9055-000

SpeedFokus (autofocus) option for OPMI Vario on S8 or S88 suspension system

Description	Cat. No.
SpeedFokus (autofocus) option in S8 / S88 Prerequisite: Previously installed video system.	000000-1227-873

Retrofit kits for S8 and S88 suspension systems

Description (UC = upgrade component)	Cat. No.
UC locking mechanism compl., S8 floor stand and ceiling mount	000000-1287-741
UC SpeedFokus (autofocus) in S8 / S88	000000-1308-545
15" TFT monitor with arm and instrument tray for S88 floor stand	305953-9030-000

Spare parts

OPMI Vario surgical microscope

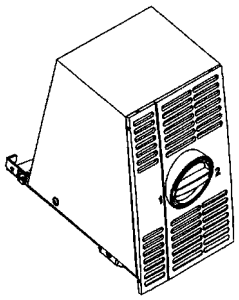
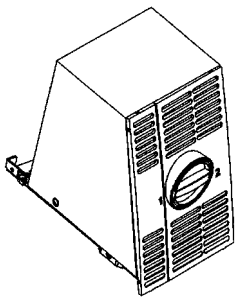
Description	Cat. No.
Light guide, 2.5 m long, with 90° adapter	30 34 81-9225

Video

Description	Cat. No.
Y/C connection cable, 2 m long (2x)	301687-9102
Y/C extension cable, 12.5 m long	301687-9110
BNC (VBS) connection cable, 10 m long (2x)	301687-9101
Y/C connection cable (plug - plug), 5 m long	300-281
Y/C extension cable, 5 m long	HAMA Cat. No. 42734

Suspension systems - xenon illumination system

Xenon illumination system

	Description	Cat. No.
	Complete replacement lamp module with 2 xenon lamps in transport container and with return card; in exchange for a returned module with defective xenon lamps	304977-9036-700
	Complete xenon lamp module with 2 xenon lamps (new component)	304977-9036-000

Accessories

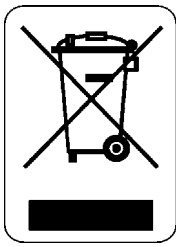
Caution:
Operate the system using only the accessories included in the delivery package. If you wish to use other accessories, make sure that Carl Zeiss Surgical GmbH or the manufacturer of the accessories has proved and confirmed that these accessories meet the respective safety standards and can be used without risk.

Description	Weight [kg]	Cat. No.
X-Y coupling incl. X-Y power cable for S8/S81	4.65	1043-103
Coupling for OPMI with spigot mount for S8	0.70	305952-8030
Double iris diaphragm	0.09	303354-0000
Dovetail mount for the installation of micromanipulators on OPMI Vario		1209-639
Adapter plate for laser micromanipulators with 48 mm dia.		1309-933
Dovetail mount for the installation of Zeiss MM6 micromanipulator on OPMI Vario	0.05	1079-870
Stereo bridge	1.10	1040-085
Rotatable dovetail for binocular tubes	0.17	301007-0000
Tiltable binocular tube, f=170 mm, 180°	0.89	303791-0000
Straight binocular tube, f=170mm	0.48	303765-0000
Inclined binocular tube, f=170mm, 45°	0.60	303784-0000
Sleeves for tubes with screw thread (2x)	0.02	305542-0107
10x push-in widefield eyepiece (2x)	0.26	305542-0000
12.5x push-in widefield eyepiece (2x)	0.26	305543-9901
Stereo coobservation module with two pivot joints	0.95	1063-869
Long mono coobservation tube	1.20	302706-0000
Short mono coobservation tube	0.17	1079-519
Beam splitter 50/50	0.50	301513-9902
Beam splitter 20/80	0.50	301503-9901

Description	Weight [kg]	Cat. No.
Water-proof foot control panel 2 with 14 functions (6 m cable)	4.90	304979-9030
Water-proof foot control panel 2 with 14 functions (3m cable)	4.60	304979-9050
Video objective lens f=50mm, C-mount (for 1/3" 1 CCD)	0.37	301677-9050
Video objective lens f=60mm, C-mount (for 1/2" 1 CCD, 1/3" 1 CCD, 1/3" 3 CCD)	0.37	301677-9060
Video objective lens f=85mm, C-mount (for 1/2" 1 CCD, 1/2" 3 CCD)	0.37	301677-9085
Video objective lens f=105mm, C-mount (for 1/2" 1 CCD, 1/2" 3 CCD, 2/3" 1 CCD)	0.41	301677-9105
Video objective lens VOL 442		301681-9010
Video objective lens VOL 802		301681-9008
MediLive Primo with C-mount adapter PAL	6.40	308203-9100
MediLive Primo with C-mount adapter NTSC	6.40	308203-9150
MediLive Primo with compact camera PAL	6.40	308203-9110
MediLive Primo with compact camera NTSC	6.40	308203-9160
MediLive Trio 3 CCD mono PAL for C-mount	5.00	1309-965
MediLive Trio 3 CCD mono NTSC for C-mount	5.00	1309-966
MediLive Trio 3 CCD mono PAL for VOL	5.00	1309-963
MediLive Trio 3 CCD mono NTSC for VOL	5.00	1309-964
Canon EOS 10D digital SLR camera	0.92	1229-580
Photo adapter f=340 T2	0.42	1022-973
SpeedFokus for OPMI Vario S88,S8,S81		1227-873
Standard cable set, external video rack		1294-229
S88 instrument tray, complete		1352-729

Disposal

User information
on the disposal of electrical and electronic devices



This symbol means that the product must not be disposed of as normal domestic waste.
The correct disposal of electrical or electronic devices helps to protect the environment and to prevent potential hazards to the environment and/or human health which may occur as a result of improper handling of the devices concerned.
For detailed information on the disposal of the product, please contact your local dealer or the device manufacturer or its legal successor. Please also note the manufacturer's topical information on the internet. In the event of resale of the product or its components, the seller is required to inform the buyer that the product must be disposed of in accordance with the applicable national regulations currently in force.

For end customers in the European Union

Please contact your dealer or supplier if you wish to dispose of electrical or electronic devices.

Information on disposal in countries outside the European Union

This symbol is only applicable in the European Union. For the disposal of electrical and electronic devices, please observe the relevant national legislation and other regulations applicable in your country.

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Technical data of OPMI VARIO

OPMI® VARIO surgical microscope

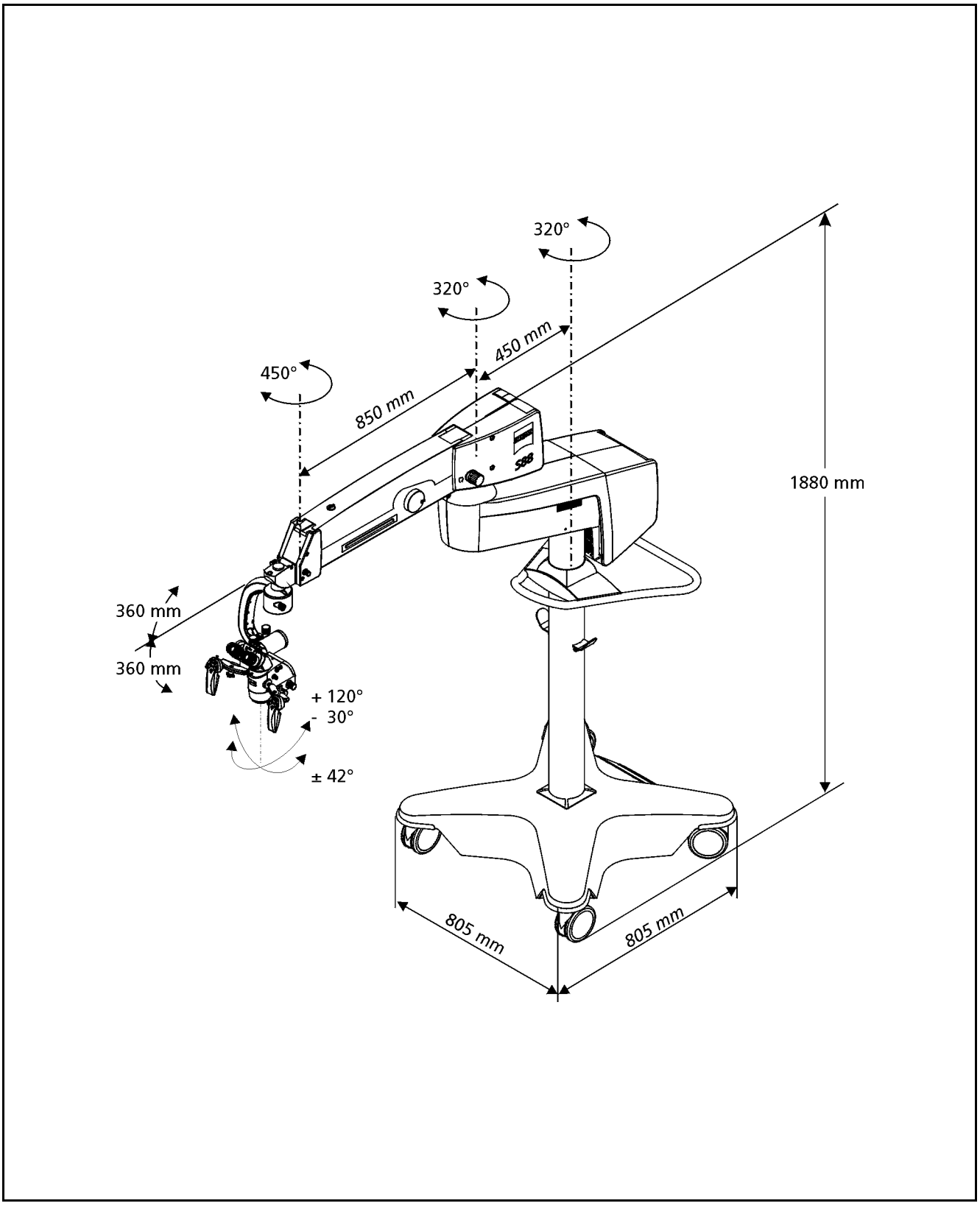
Magnification	Motorized zoom system, zoom ratio 1:6, magnification factor γ = 0.4x - 2.4x.
Total magnification with 10x eyepiece:	2.4x - 14.6x at a working distance of 200 mm 1.5x - 8.7x at a working distance of 415 mm
Total magnification with 12.5x eyepiece:	3x - 18.2x at a working distance of 200 mm 1.9x - 10.9x at a working distance of 415 mm
Fields of view with 10x eyepiece:	14 mm - 84 mm at a working distance of 200 mm 23 mm - 141 mm at a working distance of 415 mm
Fields of view with 12.5x eyepiece:	12 mm - 73 mm at working distance of 200 mm 20 mm - 116 mm at a working distance of 415 mm
Focusing	Continuous motorized focusing via integrated Varioskop. Focusing range 200 mm to 415 mm
Focal lengths f	At a working distance of 200 mm: f = 279 mm, at a working distance of 300 mm: f = 366 mm, at a working distance of 415 mm: f = 467 mm
Illuminated field diameter	At a working distance of 200 mm min. 11 mm / max. 95 mm At a working distance of 415 mm min. 13 mm / max. 165 mm
Tubes / Eyepieces	180° tiltable binocular tube, f = 170 mm 10x widefield eyepieces (option: 12.5x) with magnetic coupling.
Electrical standard	Complying with IEC 60601-1/ EN 60601-1; UL 60601-1; CAN/CSA-C22.2 No. 601.1-M90 Protection class I, Type B equipment
Weight	8.80 kg, OPMI Vario with standard suspension system (excl. tube and eyepieces) 12.25 kg, OPMI Vario with X-Y coupling (excl. tube and eyepieces)

Technical data of S88 floor stand

S88 floor stand

Mechanical data

Suspension arm	Length...850 mm Swivel angle...320° Vertical lift...± 360 mm
Carrier arm	Length...450 mm Swivel angle...320°
Stand height	1880 mm
Base	805 x 805 mm (length x width)
Admissible max. load on suspension arm	20 kg (complete microscope equipment, including accessories)
Total weight	Approx. 215 kg


320°
320°
450 mm
450°
850 mm
1880 mm
360 mm
360 mm
+ 120°
- 30°
± 42°
805 mm
805 mm

Technical data of S88 floor stand with lifting column

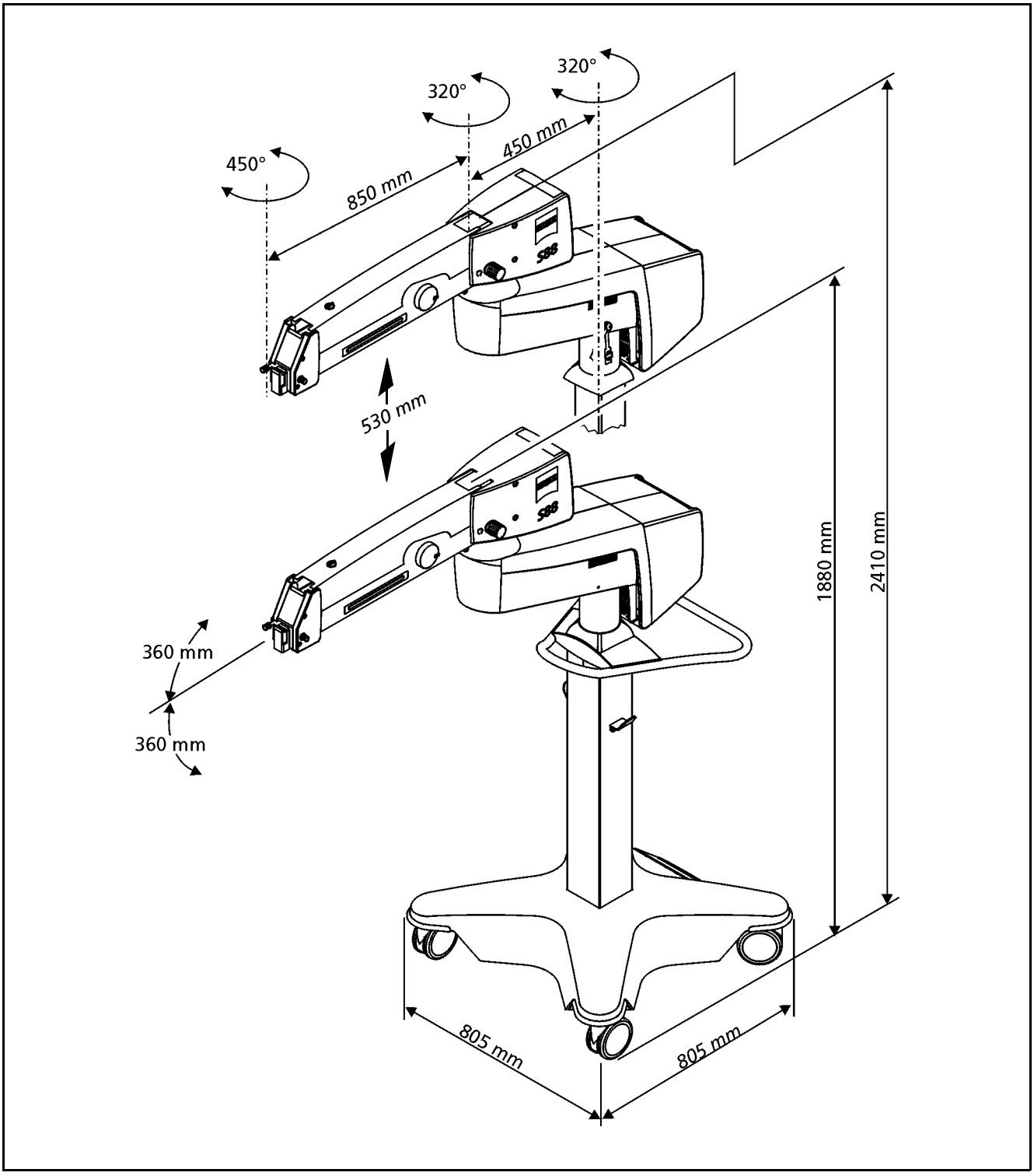
S88 floor stand with lifting column

Mechanical data

Suspension arm	Length...850 mm Swivel angle...320° Vertical lift...± 360 mm
Carrier arm	Length...450 mm Swivel angle...320°
Stand height	1880 mm ... 2410 mm
Base	805 x 805 mm (length x width)
Admissible max. load on suspension arm	20 kg (complete microscope equipment, including accessories)
Total weight	approx. 240 kg

Technical Data, Lifting Column

Rated voltage	24 VDC
Power consumption	5 A
Vertical lift, total	530 mm
Lifting force	2000 N
Lifting speed	5.5 mm/sec
Interval (operation / pause)	1 min / 9 min


320°
320°
450°
450 mm
850 mm
530 mm
360 mm
360 mm
1880 mm
2410 mm
805 mm
805 mm

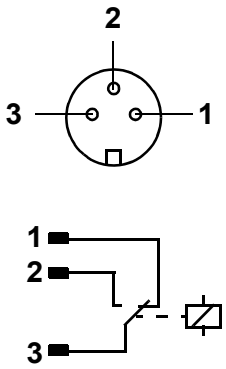
Electrical data of S88 floor stand

Power requirements	Only connect the suspension system to wall outlets which are provided with a properly connected protective ground conductor.
Rated voltage	115 VAC (100...125 VAC± 10%) 230 VAC (220...240 VAC± 10%)
Current consumption	115 VAC max.10 A 230 VAC max. 8 A
Rated frequency	50...60 Hz
Fuses	Automatic circuit breaker
Electrical outlets	Power outlet 115/230 VAC, max. 5 A Power outlet 115/230 VAC, max. 2 A (Via power switch) X-Y coupling Surgical microscope Remote control socket for an external signal of a maximum of 24 V / 0.5 A.
Electrical standard	Complying with IEC 60601-1/ EN 60601-1; UL 60601-1; CAN/CSA-C22.2 No. 601.1-M90 Protection class I, degree of protection IPXO Type B equipment Product classification I as per directive 93/42/EEC, Annex IX
Approval	
EMC requirements	The system meets the EMC requirements of IEC 60601-1-2. The system meets the RFI requirements of Class A (hospital grade).

The system has been designed for continuous operation.

Remote socket

View of connector side



Xenon illumination system

Fiber optic illumination	Xenon short-arc reflector lamp Color temperature: approx. 5000 K Rated power: approx. 100 W Backup lamp in lamp housing, manually selectable.

Video monitor

LCD display	TFT color monitor
Screen size	15"
Resolution	1024 x 768
Reaction time	25 ms
Brightness	200 cd/m^2
Contrast ratio	200:1
Display colors	16.7 million
Sampling rate	Horizontal: 30 - 80 KHz, vertical: 50 - 75 Hz
Viewing angles	Horizontal: 178°, vertical: 178°
Video input ports	DVI, VGA, S-Video, cVBS (Video), Component
Power input	24 VDC ± 20%
Power consumption	28W
Weight	3.2 kg
Dimensions (H x W x D)	286 x 348 x 51 mm

S-Video mode, Composite mode

Resolution	Refresh rate (HZ)	Description
640 x 480	50	-
640 x 480	60	NTSC
720 x 576	50	PAL
720 x 576	60	-

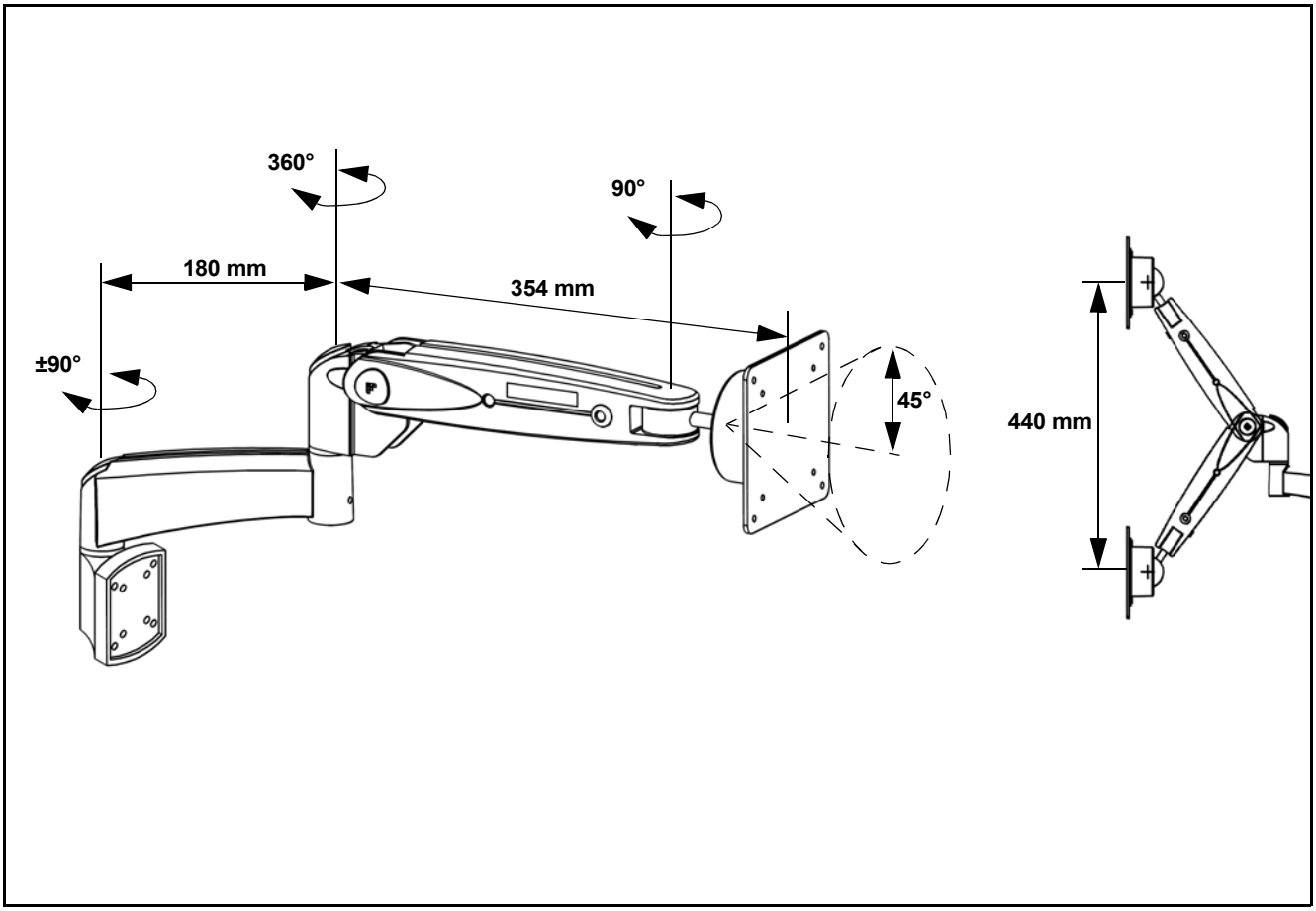
DVI mode,VGA mode, Component mode

Resolution	Refresh rate (HZ)	Description
640 x 480	50	-
640 x 480	60	-
720 x 576	50	-
720 x 576	60	-
800 x 600	50	-
800 x 600	60	VESA
800 x 600	70	VESA
800 x 600	75	VESA
1024 x 768	50	-
1024 x 768	60	VESA
1024 x 768	70	VESA
1024 x 768	75	VESA

Monitor arm

Mechanical data

Suspension arm:	Length...354 mm Swivel angle...360° Vertical lift...± 220 mm
Carrier arm	Length...180 mm Swivel angle...± 90°
Admissible max. load on the monitor arm	9.0 kg
Total weight	Approx. 4.13 kg

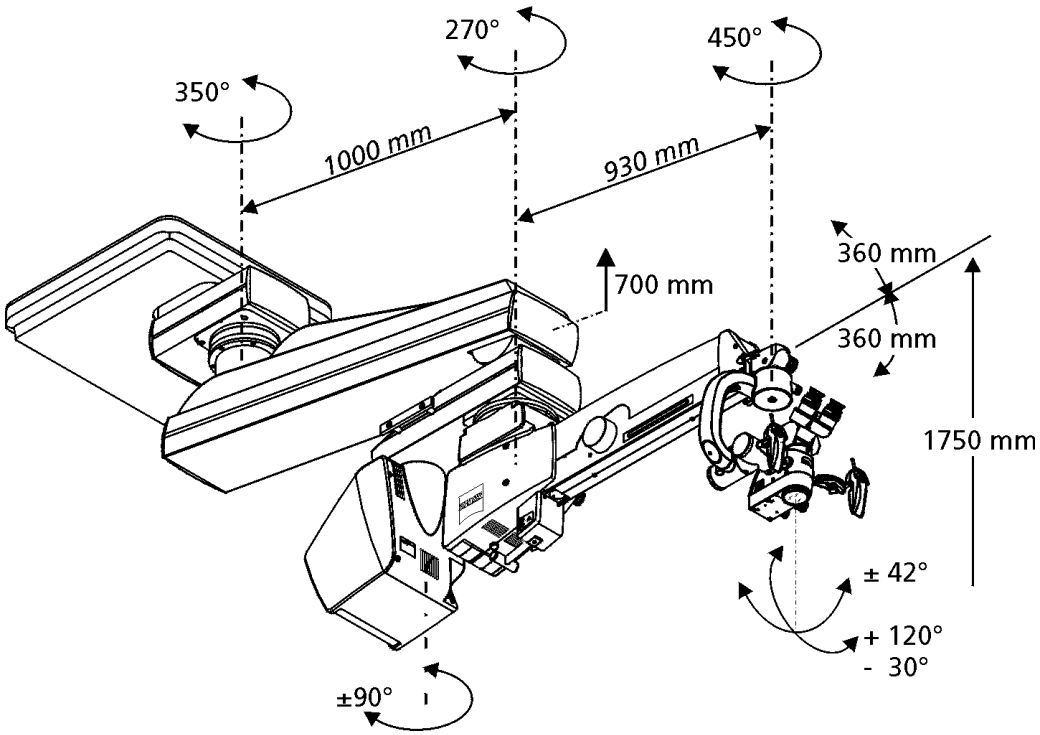


Technical data of S8 ceiling mount

S8 ceiling mount

Mechanical data

Suspension arm	Length...930 mm Swivel angle...270° Vertical lift...± 360 mm Swivel angle of electronics box...180° (± 90°)
Lift and carrier arms	Length...1000 mm Swivel angle...270°
Recommended working height	Approx. 1750 mm (on grip)
Admissible max. load on suspension arm	20 kg (complete microscope equipment, including accessories)
Weight of ceiling mount	Approx. 200 kg


270°
450°
350°
1000 mm
930 mm
360 mm
700 mm
360 mm
1750 mm
± 42°
+ 120°
- 30°
±90°

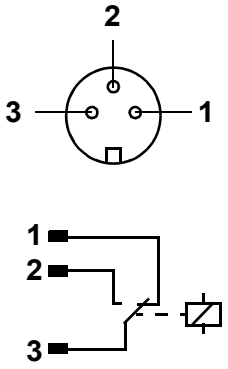
Electrical data of S8 ceiling mount

Rated voltage	230 VAC (220...240 VAC± 10%) 115 VAC (100...125 VAC± 10%)
Current consumption	230 VAC 3 A 120 VAC 5 A 100 VAC 6 A
Rated frequency	50...60 Hz
Fuses	Automatic circuit breaker
Electrical outlets	– X-Y coupling – Surgical microscope – Remote control socket for an external signal of a maximum of 24 V / 0.5 A.
Electrical standard	Complying with IEC 60601-1/ EN 60601-1; UL 60601-1; CAN/CSA-C22.2 No. 601.1-M90 Protection class I, degree of protection IPXO Type B equipment Product classification I as per directive 93/42/EEC, Annex IX
Approval	
EMC requirements	The system meets the EMC requirements of IEC 60601-1-2. The system meets the RFI requirements of Class A (hospital grade).

The system has been designed for continuous operation.

Remote socket

View of connector side



Xenon illumination system

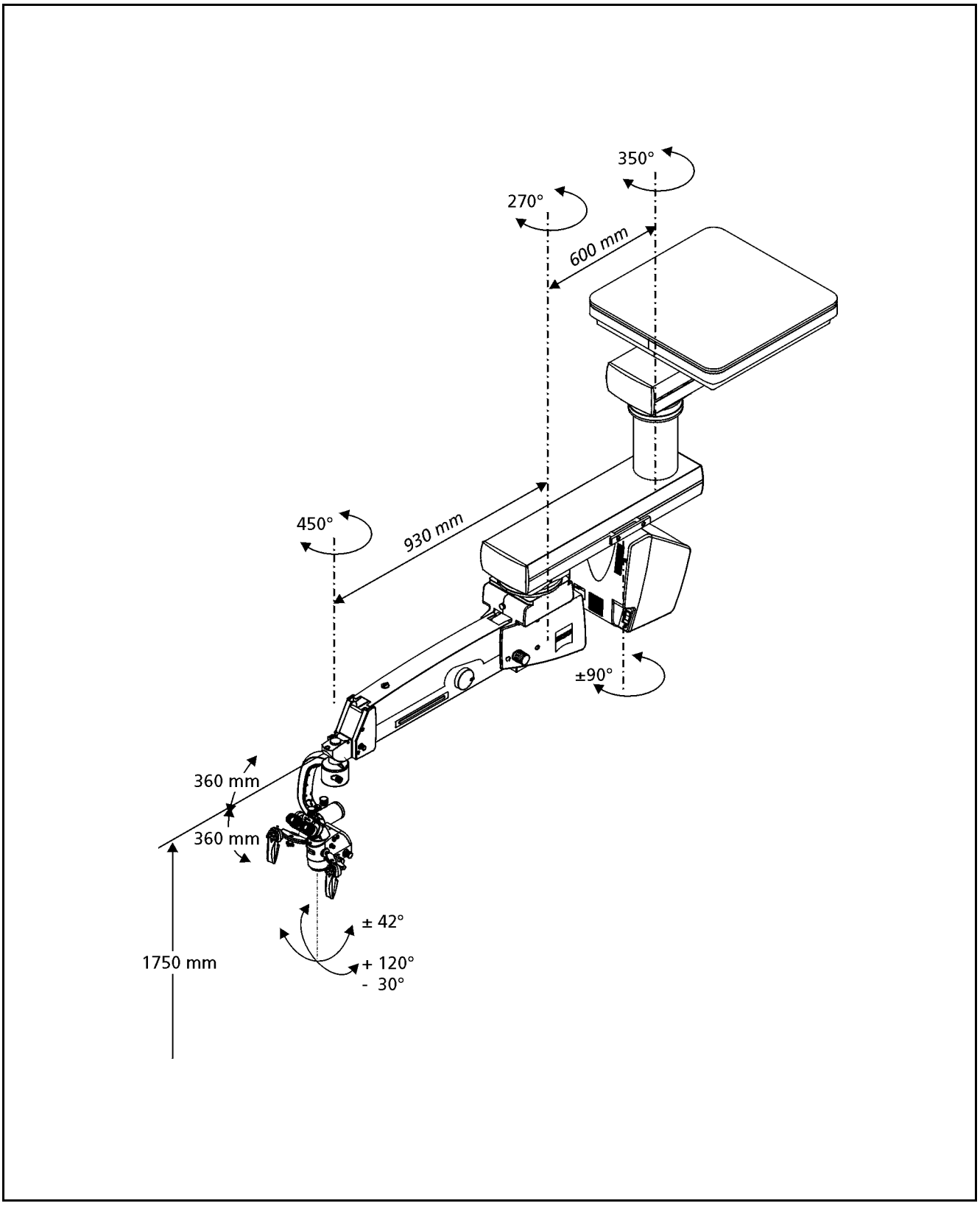
Fiber optic illumination	Xenon short-arc reflector lamp Color temperature: approx. 5000 K Rated power: approx. 100 W Backup lamp in lamp housing, manually selectable.

Technical data of S81 ceiling mount

S81 ceiling mount

Mechanical data

Suspension arm	Length...930 mm Swivel angle...270° Vertical lift...± 360 mm Swivel angle of electronics box...180° (± 90°)
Carrier arm	Length...600 mm Swivel angle...270°
Recommended working height	Approx. 1750 mm
Admissible max. load on suspension arm	20 kg (complete microscope equipment, including accessories)
Weight of ceiling mount	Approx. 178 kg


350°
270°
600 mm
450°
930 mm
±90°
360 mm
360 mm
1750 mm
± 42°
+ 120°
- 30°

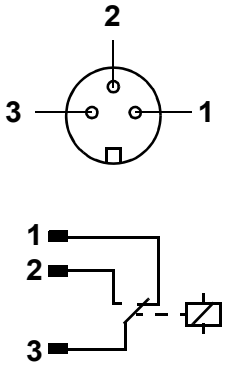
Electrical data of S81 ceiling mount

Rated voltage	230 VAC (220...240 VAC± 10%) 115 VAC (100...125 VAC± 10%)
Current consumption	230 VAC 3 A 120 VAC 5 A 100 VAC 6 A
Rated frequency	50...60 Hz
Fuses	Automatic circuit breaker
Electrical outlets	– X-Y coupling – Surgical microscope – Remote control socket for an external signal of a maximum of 24 V / 0.5 A.
Electrical standard	Complying with IEC 60601-1/ EN 60601-1; UL 60601-1; CAN/CSA-C22.2 No. 601.1-M90 Protection class I, degree of protection IPXO Type B equipment Product classification I as per directive 93/42/EEC, Annex IX
Approval	
EMC requirements	The system meets the EMC requirements of IEC 60601-1-2. The system meets the RFI requirements of Class A (hospital grade).

The system has been designed for continuous operation.

Remote socket

View of connector side



Xenon illumination system

Fiber optic illumination	Xenon short-arc reflector lamp Color temperature: approx. 5000 K Rated power: approx. 100 W Backup lamp in lamp housing, manually selectable.

Ambient requirements

For operation	Temperature Rel. humidity Air pressure	+10 °C...+40 °C 30%...75% 700 hPa...1,060 hPa
For transportation and storage	Temperature Rel. humidity (without condensation) Air pressure	- 40 °C...+70 °C 10%...100% 500 hPa...1,060 hPa

CE conformity

The system meets the essential requirements stipulated in Annex I to the 93/42/EEC Directive governing Medial Devices. The system is labeled with: CE

Changes to the system

Subject to changes in design and scope of delivery as a result of ongoing technical development.

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